QAPP ELEMENT 1

TITLE / SIGNATURE PAGE

The QAPP must contain a Title/Signature Page. This title page will document the following:

1) The complete title of the program and investigation (e.g. RCRA Facility Investigation, etc.) specifying the location (city, state) of the facility and its U.S. EPA identification number;

2) The firm that prepared the plan as well as the organization for whom it was prepared; and

3) The date and the revision number (the initial draft should be considered Revision 0 and subsequent revisions as Revision 1, 2 etc.).

Functionally, this page ensures that the desired content and level of detail are achieved through the review and approval (at a minimum) by the following personnel:

- o Facility Quality Assurance Officer
- o QAPP Preparer
- o US EPA Project Coordinator/Permit Writer
- o US EPA Regional Quality Assurance Manager
- o Laboratory Directors

NOTE: The titles and names of all individuals appearing on the title page will be consistent with the references to these people elsewhere in the QAPP (e.g. project organization, corrective action, and QA reports to management sections).

QUALITY ASSURANCE PROJECT PLAN

FOR THE RCRA [PROJECT TYPE] AT

[FACILITY NAME]

U.S. EPA ID NUMBER [ILD 000 000 000]

REVISION [NUMBER]

[DATE OF SUBMITTAL]

Prepared by: [Contractor Name]

Prepared for: [Facility/Contractor]

[Contractor Project Manager]	Date
[Contractor QA Officer]	Date
[Laboratory QA Manager] (if applicable)	Date
U.S. EPA RCRA Project Coordinator/ RCRA Permit Writer	Date
U.S. EPA Regional Quality Assurance Manager	Date

QAPP ELEMENT 2

TABLE OF CONTENTS

All QAPP sections, tables, figures, and appendices (and contents of individual Appendices) shall be included in a Table of Contents. All subsections shall be numbered as in the sample Table of Contents. For instance, in the submitted QAPP, section 3.2 should correspond to "Accuracy".

Additionally, the QAPP Table of Contents shall address each of the following items:

1. An "Introduction" to the QAPP shall be referenced in the QAPP's Table of Contents.

2. A serial listing of the 16 QAPP elements shall be presented according to the structure indicated in the sample Table of Contents.

3. A listing of any appendices and subsections which are required to augment the QAPP as presented (i.e., standard operating procedures (SOPs), summaries of past data, etc.) shall be presented.

4. Following the list of appendices, a listing of any tables and figures which are required to augment the QAPP requirements shall be presented.

5. After the list of appendices will follow a complete listing of recipients including the U.S. EPA Quality Assurance Section Chief who will receive official copies of the QAPP and any subsequent revisions.

Page numbers shall be added to the Table of Contents of the submitted QAPP. Furthermore, within the body of the submitted QAPP, page numbers will be presented in accordance with the Document Control Format (DCF). A DCF should be used to individually paginate each QAPP element to facilitate revisions as well as ensure that no pages are missing. The DCF to be placed in the upper right hand corner of each page shall include:

1. Project Name

2. Revision Number

3. Revision Date

4. Section

5. Page Number

The Project Name may be shortened or abridged as necessary. The Page Number will be stated relative to the total number in the section (e.g. Section 4, Page 2 of 8). A new QAPP section will be started at page one. All other documents which are referenced in the QAPP (Work Plan, Field Sampling Plan, etc.) and have become a part of the QAPP by such reference should also include the DCF. A sample Table of Contents is shown below. Although minor deviations from this example will be permissible, each of the section headings and subheadings shown in the example must be included in the submitted Table of Contents and the submitted QAPP must be organized as reflected in the following Table of Contents.

TABLE OF CONTENTS

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QAPP ELEMENT 3

PROJECT DESCRIPTION

All the QAPP elements are significant, in the sense that all can be viewed as integrally defining a process which when implemented can result in generated data that will be of documented quality, and also hopefully of a known reliable nature. However, the Project Description remains one of the most critical elements of a QAPP. For it is in this particular element that the purpose for implementing the project in a particular fashion, as well as the ultimate goals that are desired to be achieved, are fully explained.

Programmatic regulatory provisions usually require that environmental chemical measurements must be made in order to address certain Federal requirements or criteria, many of the project objectives that will be defined here shall, most often, be defined programmatically. However, this is the portion of the QAPP where it is necessary to define site-specific details so that generally stated Federal requirements, such as the need to investigate in order to "define the horizontal and vertical extent and rate of contamination" must be fully fleshed out into a working program for facility investigation.

QAPP preparers are encouraged to seek and present in this portion of the QAPP the known action or environmental criteria or health based levels (both State and Federal) which generated data may be eventually compared to. Outside of improper implementation of an approved QAPP through field sampling, or laboratory error, poorly defined project objectives may be the area most likely to result in unusable data. If the purpose of the overall project is not thought out carefully or conscientiously beforehand, then ultimately the generated data may not prove to be useful for any of a number of programmatic goals. Even if the data collected has been shown to be of known, documented quality and potentially useable for one particular function, if the data is later found not to address the real objectives that should have been defined before project implementation, then the investigation may have to be repeated!

The Project Description should include or reference the following items. (A technical person unfamiliar with the project must be able to understand what you have written.)

- A statement of the decision(s) to be made or the question(s) to be answered.
- A description of the site, facility, process, and/or operating parameters to be studied.
- The anticipated uses of the data.
- A list of all environmental measurements to be performed.
- A project schedule, indicating when samples are expected to be submitted to the laboratory.
- A summary table listing, for each sampling location, the total numbers of samples (including investigative, quality control, split and reserve), sample type or matrix,and all measurements to be performed, differentiating where applicable the critical measurements from the noncritical measurements.

The contents requirements for Project Description are more fully outlined below. If sections in the RFI Workplan, or Description of Current Conditions Report are found to address some of these items (shown in boldface), then specific sections (page or section numbers) of these identified reports may be referenced in the Project Description portion of the QAPP:

In the **Introduction** to the QAPP, the overall project objectives should be explained. This should be a succinct description of the project, including a brief statement addressing the phase(s) of the work and intended objectives and investigation. The section should answer the basic questions, "What is the purpose of the work effort?", and "Why has the facility been asked to complete the work?".

The **Site Description** should focus on a description of site-specific features, including location, size, borders, important physical features, topographic, geological and hydrogeological information. Each of these items should be clearly addressed. The QAPP preparer should also consider whether there are any unique or special site-specific features of any kind which may have some later bearing on the way in which data is obtained.

Under the **Site History or Background** section of this element, the chronological history of the site leading to its current status under RCRA should be outlined. Documentation of waste streams managed and releases known to have occurred on-site, a summary of any previous sampling and analysis efforts, data with overview of these results or copies of previous reports should be appended to the QAPP. Site histories are unique and often there are large historical gaps. Usually, much of the known information has already been gathered prior to the stage where an RFI is being conducted. Therefore, summaries of this information may only be required here, provided that the facility can identify previously generated reports precisely by title, date, and author.

The Project Objectives must be clearly outlined. There should be a succinct description of specific project objectives in terms of individual task or phase of work. This is the section where the QAPP preparer should discuss how the general programmatic goals can be addressed through specific tasks that will be implemented.

Target compounds and parameters must be described. The QAPP preparer must provide a list of all compounds that will be analyzed in samples taken from the facility. For the purposes of the RCRA program, such compounds, analytes, and parameters may be derived from any of a number of lists such as the Hazardous Substance List, the 40 CFR Part 261 Appendix VIII or IX lists, the toxicity characteristic list, method specific lists (where the methods have been validated for sets of constituents regulated under RCRA or by the U.S. EPA, such as the SW-846 1986 or 1990 version methods, the CLP methods), or other parameters such as those of possible use to hydrologists in assessing general groundwater quality.

In preparing a facility-specific target list, there are three rules of thumb to be aware of. First, any set of constituents representing a subset of the Appendix IX list must be supplemented with a good rationale for why certain constituents have been eliminated from the list of target compounds for the proposed project. Secondly, the selection of constituents must be shown to be consistent with the overall objectives or programmatic goals intended for the proposed project. Thirdly, even though the U.S. EPA shall consider the rationale presented for why certain constituents can be excluded from the facility list, if proposed analytical methods or strategies will still allow analytical measurement of those constituents (proposed for exclusion) anyway, then those constituents must also be reported in the RFI report. Tabular presentation of the actual list is preferred when used in conjunction with the rationale, and the list should address each matrix to be encountered, as well as the intended data usages, and anticipated method detection limits for each constituent in its respective matrix.

The Intended Data usages should provide a brief statement outlining the specific usages of all data to be obtained, including any data generated from field screening and/or field measurements. Please note that regulatory actions under such laws (and corresponding regulations) as RCRA, CERCLA, Safe Drinking Water Act, LUST, State regulatory authorities, the Clean Water Act, the Clean Air Act, may sometimes dictate the implementation of certain analytical methods, quality control, and chain-of-custody procedures. If possible, the intended data usages should be presented in tabular format.

These may include, but are not limited to, the following:

1. Qualitative or semi-quantitative analyses for selection of sample and/or sampling locations;

2. Future enforcement actions;

3. Data for remedial action alternatives;

4. Determination of hazardous waste characteristics for remedial removals;

5. Protection of Public Health;

6. Definition of extent of environmental contamination.

In addition to the rationale for target compounds and parameters, there should be a Sample Network and Rationale presented in the QAPP. At a minimum, inclusion of, or elaboration on, the following items is required;

1. Diagrams or site maps showing sampling locations;

2. Thorough rationale for selected sampling locations;

3. Summary table listing matrices, field and laboratory parameters, and their frequency of collection;

4. A categorized listing of matrix types to be encountered;

5. Any field screening to be performed;

6. Any field measurements to be performed;

7. Any measurements to be performed in conjunction with hydrogeologic investigations;

8. Ambient monitoring of media at the facility subject to investigation; and

9. Pertinent regulatory requirements.

Please note that for RCRA purposes when groundwater sampling is to be conducted for metals analyses, the QAPP must specify the procedures for collection of both field filtered and unfiltered samples. Furthermore, soil samples shall not be composited.

A **Project Schedule**, providing a description of dates anticipated for project initiation, milestones, and completion of the project as well as monitoring activities shall be provided. A milestone table or a bar chart consisting of project tasks and time lines is appropriate for this purpose.

SECTION 1

PROJECT DESCRIPTION

1.0 Project Description

This project description outlines the overall scope of an investigation to be performed in accordance with pertinent permit requirements for a permit issued on a specific date. This QAPP presents the organization, objectives, planned activities, and specific QA/QC procedures associated with the RFI for this facility. Specific protocols for sampling, sample handling and storage, chain-of-custody, and laboratory and field analyses will be described. All QA/QC procedures will be structured in accordance with applicable technical standards, U.S. EPA's requirements, regulations, guidance, and technical standards. This QAPP was prepared in accordance with a guidance manual entitled, "Region 5 Model RCRA Quality Assurance Project Plan", May, 1993.

1.1 Introduction

In this section, the overall scope of this project plan shall be described. Current status and QAPP preparation guidelines shall be explained. This QAPP has been prepared in behalf of [the facility] by (the contractor). A Project Management Plan, a QAPP, and a Health and Safety Plan have been appended to the RFI Workplan, dated_____. A Field Sampling Plan has also been prepared, which has been entirely incorporated into the QAPP through specific reference.

1.1.1 Overall Project Objectives

The purpose of the RFI is to gather sufficient information to quantify risk to public health and environment (Baseline Risk Assessment) and to consider possible remedial alternatives (Corrective Measures Study at the Site). The objectives of the RFI are to determine the nature and extent of contamination at the facility.

Objectives of the data collection will be as follows:

- Verify and further define the nature and extent of contamination in previously identified on-site and off-site areas. Data quality must be sufficient to be able to compare with State health-based criteria, and other Federal regulatory criteria that are pertinent, (e.g. TSCA rules for PCBs, and RCRA).

- Determine the nature and extent of contamination in previously uninvestigated areas. Data will eventually be compared to State and Federal regulatory criteria. [Please include a Table indicating what the pertinent criteria are.]

- Collect sufficient data on all contaminated media to support a baseline risk assessment and feasibility study.

1.1.2 Project Status/Phase

[The Contractor] will utilize an integrated and phased approach for the RFI. During the RFI, data collection will be conducted in phases, with the results of the baseline risk assessment being a determining factor in decisions regarding the necessity for additional phases of investigation. The Phase I investigation will integrate existing data with information that will be gathered through direct field investigations.

The Phase I field investigation will include:

- Surface soil (0 to 18 inches) sampling for verification and site characterization both on- and off-site;

- Subsurface soil sampling along existing and previously excavated sewer lines, and in areas where deeper soil removals have occurred;

- Groundwater sampling;

- Residential well sampling;

- Sediment and surface water sampling; and

- In-situ permeability testing of aquifer materials.

Samples will be analyzed for volatile organics, organic extractables, pesticides/PCBs and/or metals. A limited number of samples will also be analyzed for cation exchange capacity (CEC), Atterburg limits, percent moisture, grain size distribution, and total organic carbon (TOC) to determine soil physical parameters and their effect on contamination migration. A limited number of samples will also be analyzed for the Toxicity Characteristic Leaching Procedure (TCLP) to characterize the waste for disposal. Soil pH tests will be conducted on a selected number of samples at the field screening laboratory.

Data from the Phase I investigation will be qualitatively and statistically evaluated in conjunction with existing data to determine whether a Phase II investigation is necessary. The rationale and scope of any Phase II investigation will be discussed with and approved by the U.S. EPA prior to implementation.

Potential Phase II work may include:

- Additional soil/sediment sampling;
- Asbestos sampling;
- Installation of additional monitoring wells and a detailed groundwater investigation; and,
- Treatability studies or pilot testing.

If Phase I data suggests that sufficient site characterization information has been collected [the Contractor] will proceed with the risk assessment for the site. A technical memorandum, presenting the Phase I data and recommendations of the risk assessment will be prepared and submitted to the U.S. EPA. After a review of the technical memorandum, the need for implementing a Phase II investigation will be evaluated in light of the data requirements for the feasibility study.

1.1.3 QAPP Preparation Guidelines

As explained above, this QAPP has been prepared in accordance with the "Region 5 Model RCRA Quality Assurance Project Plan", dated, May, 1993. Furthermore, in meetings held with the U.S. EPA in which the Region's protocol for presentation of QAPPs, additional guidance was received on how to prepare this QAPP. One of these meetings was a formal "pre-QAPP" meeting, and discussions held prior to the pre-QAPP meeting which focused on project scoping. At all meetings, representatives from the U.S. EPA's Environmental

Sciences Division were present and available for consultation.

1.2 Site/Facility Description

A brief description of the facility, its geological setting, and associated features is presented in the section below.

1.2.1 Location

The [RCRA Facility] is an inactive lead-acid battery manufacturing operation located in [facility, County, State]. The facility occupies approximately 18 acres on U.S. Highway [facility address] northwest of the city of [City], along the eastern bank of the [River name] River [Please provide a Map]. The facility is bordered on the north by [Street Name] Street, on the south by [Street Name] Street, on the west by a State Highway garage and on the east by the parking lot of a local inn. The study area for the [site name] RFI includes the [site name] property and off-site areas immediately surrounding the site.

1.2.2 Facility/Size and Borders

This section is addressed on pages ____ through ____ of the RFI Workplan, which is herein incorporated into this QAPP through reference, and in the drawings which have been submitted along with the RFI Workplan.

1.2.3 Natural & Manmade Features

This section is addressed on pages ____ through ____ of the RFI Workplan, which is hereby incorporated into this QAPP through reference.

1.2.4 Topography

See sections _____ of the RFI Workplan for information concerning the site's general topography.

1.2.5 Local Hydrology & Hydrogeology

See sections _____ of the RFI Work Plan for information concerning the site's physical features, population and land use, geology and soil, groundwater resources and surface hydrology and drainage.

1.3 Site/Facility History

1.3.1 General History

The facility was established in [Date] to manufacture lead acid batteries, primarily for cars and trucks, first by the [Historic Facility Names] Corporation and then by the [xxx] Corporation, which used the name [xxx] when it bought the facility from [xxx] in [Date]. [xxx] acquired the [xxx] Company in [year].

Over the years of operation, successive industrial sewer lines became plugged with lead sludge. The plugged line was typically left in place and a new line was installed. As a result of leaks and sewer line backups, the soils around some of these sewers and associated sumps were found to be contaminated with lead. The upper soils around the holding lagoon also showed elevated levels of lead. Other contaminants of concern are PCBs that were found in the soil around the transformer pad, the nearby water tower pad, and below a section of the main process building (see Figure xxx).

During normal plant operation, manufacturing process wastes and wastewater became laden with lead, lead oxides, sulfuric acid, and lead sulfates. The plant's ventilation system and processes released air laden with lead contaminants to the atmosphere around the facility [reference report]. Prior to 1978, wastewater was sent through the on-site industrial sewer system, then directly to the [City/County/etc.] sanitary sewer system. Beginning in [Date], wastewater effluent was subject to pH treatment on-site followed by placement into a wastewater sedimentation lagoon. Overflow from the lagoon went to the [Name] Publicly Owned Treatment Works.

Soil on and in the vicinity of the facility has been contaminated with lead, predominantly from airborne particulates. Malfunctions and accidental spills have also contributed to contamination of on-site soils with high concentrations

1.3.2 Past Data Collection Activities

The [site name] has been subject to a number of investigations since [Date]. The following summaries are based on a review of reports and supporting documents submitted by consultants and information obtained from the project files of the U.S. EPA and the State.

Beginning in [Date], [Company name] has contracted with [contractor names], to assess the degree of contamination at the facility, and evaluate remedial actions for the identified contamination problems. These include the contaminated surface soils both on-site and in certain off-site areas, the plugged sewer lines, the pH treatment system and surrounding soils, and the PCB contamination.

Pursuant to these studies more then 7,000 cubic yards of lead and PCB-contaminated soil have reportedly been removed from on and off-site [Previous study reference]. The cleanup standard was to remove all lead-contaminated soil down to a level below 1000 ppm, as recommended and approved by the State. This standard was coupled with a requirement to lime all remaining soils where lead levels exceeded 250 ppm in order to maintain a soil pH greater than 7.0 and thereby reduce the mobility of the lead still in the soil. Soils contaminated with PCBs were removed from the facility in two separate actions. In the first action, PCB soils were reportedly removed down to a level below 50 ppm [Previous study reference]. In the second action, soils were removed to a level below 10 ppm [Previous study reference]. Verification samples following removal actions will be taken in accordance with this QAPP.

1.3.3 Current Status

Based on reports and documents reviewed for the site, and a current assessment of all available information, the following target compounds and source area release mechanisms have been targeted for further investigation.

- Past Facility Operations. Records indicate that during the active period of battery manufacture, the plant's ventilation system and processes released lead-laden air and possibly other contaminants to the atmosphere. Malfunctions and accidental spills also may have released both organic and inorganic contaminants to the environment. Other metals which may have been released along with lead include; antimony, arsenic, tin, calcium, strontium, tellurium, and barium. Organic chemicals that were used at the facility identified from RCRA documentation, include: trichloroethane, methylene chloride, paint thinner, epoxy resin, refined coal tar, and lubricant containing trichloroethylene.

- Wastewater Sewers. During plant operations, manufacturing process wastewater, containing lead oxides, lead sulfates, sulfuric acid, and possibly other metals was sent through the industrial sewer system to be discharged to the [City] publicly owned treatment works (POTW). After [Date], wastewater was subject to pH adjustment and sedimentation prior to discharge to the POTW. Documents indicate that as

industrial sewers became plugged with lead, they were left in place and new sewer lines were installed adjacent to the old. Reports indicate the soils around some of the sewer lines were heavily contaminated with lead, suggesting leaks. Other reports indicate that plugged sewers caused wastewater to back up in sumps and manholes causing wastewater releases to the ground surface.

- Surface Impoundment. The surface impoundment located in the southwest corner of the facility received pH adjusted wastewater for sedimentation. Documents indicate concerns over cracks in the concrete lining and the integrity of joints in the concrete construction. Concerns regarding overtopping of the impoundment have also been reported. Sample analysis of the sludge which settled in the wastewater lagoon indicates that high levels of waste lead, iron, aluminum, arsenic, barium, and calcium were generated during the manufacturing process.

- PCB Transformers. Records indicate that two PCB transformers located near the northwest corner of the facility leaked, releasing contaminated dielectric fluid to surrounding soils.

The historical release of contaminants as described above resulted in the contamination of on- and off-site soils and potentially the [Facility] facility and nearby buildings. Although significant attempts have been made to remediate the contamination i.e., on- and off-site soil removal, sewer excavations, etc., potentially significant concentrations of lead may remain in soils even though the primary sources have been removed. At this time, these soils constitute a secondary source of contamination, potentially affecting human and environmental targets in the area of the site. Similarly, lead contamination in on- and off-site structures may present a continuing exposure point for workers, residents, and visitors to the area.

1.4 Project Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements which specify the quality of the data required to support decisions made during RI/FS activities and are based on the end uses of the data to be collected. As such, different data uses may require different levels of data quality. There are at least five analytical levels which address various data uses and the QA/QC effort and methods required to achieve the desired level of quality.

1.4.1 Specific Objectives and Associated Tasks

For this project, it will be necessary to gather sufficient information to evaluate the nature

and extent of releases from _____ solid waste management units, and also to determine whether unreasonable health risks are associated by the _____ areas. This could include evaluation of the impact of releases on human health and the environment both within and beyond the facility property boundary, if applicable.

The specific objectives of the data collection at the [Facility name] are as follows:

Some field monitoring will be utilized for purposes of screening for "hot spot" areas and for worker health safety. Site characterization to locate areas for subsequent and more accurate analyses will be conducted. These types of data include those generated on-site through the use of HNu, pH, conductivity, and other real-time monitoring equipment at the site. The field data requirements are summarized in the submitted table.

In order to assess the presence or absence of hazardous constituents at the _____ and the _____, soil samples will be screened during this Phase I RFI for likely contaminants of concern, including volatile organics, organic extractables, pesticides/PCBs and (both) total and TCLP metals. In the event that metals are found to exceed TCLP action levels in soil or sediment, then any excavated soil will be regarded as hazardous waste by characteristic. A limited number of samples will also be analyzed for cation exchange capacity (CEC) and other soil characteristics. Groundwater samples will also be tested for the parameters indicated in the laboratory (with exception of CEC & other soil properties). This information will be used to compare results to representative background soil characteristics. If detectable low levels of constituents are identified, then the values shall be subject to a risk assessment study to be sent to the U.S. EPA at the conclusion of the study. This risk assessment shall be prepared according to guidance contained in a document, "Guidance for Data Useability in Risk Assessment", (EPA/540/G-90/008), October, 1990. For purposes of performing the risk assessment study, levels of undetected contaminants shall be assumed to be present at concentrations equal to 1/2 of the respective measured method detection limits. If the risk assessment results appear favorable, then the need for Phase II may be obviated, and [Facility name] will seek the "No Action Alternative" option through a modification to its RCRA permit.

In order to accomplish these goals, a confirmational level of analytical quality is needed. This provides the highest level of data quality and includes, but is not limited to the purposes of risk assessment, evaluation of remedial alternatives and establishing cleanup levels. These analyses require full documentation of SW 846 analytical methods, sample preparation steps, data packages and data validation procedures necessary to provide defensible data. Quality Control must be sufficient to define the precision and accuracy of these procedures at every step.

If the data generated during Phase I does not support the case for the "No Action Alternative", then a second planned Phase of activity will begin subject to an approved modification to this QAPP.

1.4.2 Project Target Parameters and Intended Data Usages

The list of target parameters for this project is included in (the Appendix to this Model QAPP). Intended data usages are to screen for Phase I analytes. The data shall be compared to background soil levels, or to measured detection limits and other (low level) health based criteria with the ultimate objective being to develop a risk assessment study. Data may also be used to assess feasability of using certain remediation technologies if contamination is found to exist. However, it is understood that a QAPP modification to allow bench scale testing of a remediative process, or simply to allow further evaluation of remediative process feasability may be required.

1.4.2.1 Field Parameters

The intended field parameters are stated in (the Appendix to this Model QAPP).

1.4.2.2 Laboratory Parameters

The intended laboratory parameters are stated in (the Appendix to this Model QAPP).

1.4.3 Data Quality Objectives

The intended data quality objectives for this project are summarized in (the Appendix to this Model QAPP).

1.5 Sample Network Design and Rationale

The sample network design and rationale for sample locations (in respective media) is fully described in detail in section _____ of the Field Sampling Plan. Rationale for why certain groups or classes of hazardous constituents listed in 40 CFR Part 261, Appendix IX, will not be analyzed during Phase I is also described in the Field and Sampling Plan.

1.5.1 Sample Network by Task and Matrix

Sample matrices, analytical parameters and frequencies of sample collection can be found in

(the Appendix to this Model QAPP).

1.5.2 Site Maps of Sampling Locations

Maps showing intended soil, sediment and surface water sampling locations are included as Figures in the Field Sampling Plan, which is fully incorporated into this QAPP through reference. It is possible, however, that depending on the nature of encountered field conditions some of these locations will be changed. The person who shall be responsible for making such decisions will be the Site Field Manager whose responsibilities are described in Section 2 of this QAPP. Locations of monitoring and residential wells to be sampled, with associated screen depths is also indicated in the Field Sampling Plan.

1.5.3 Rationale of Selected Sampling Locations

The rationale for why the selected sampling locations (and depths) were chosen in conjunction with each solid waste management unit and area of concern is fully described in the Field Sampling Plan, along with statistical arguments supporting the number of samples to be taken. (e.g. A total of seven background soil samples shall be taken to fully characterize background conditions with respect to each parameter, at a statistically high level of confidence.)

1.5.4 Sample Network Summary Table

The sample network for this project is presented in tabular format in the Field Sampling Plan (and in the Appendix to this Model QAPP).

1.6 Project Schedule

1.6.1 Anticipated Date of Project Mobilization

The earliest date for which samples are planned to be collected is _____. However, as indicated in the submitted Task Bar Chart, some activities such as installation of monitoring wells are scheduled to begin on _____.

1.6.2 Task Bar Chart and Associated Timeframes

The dates of projected milestones are indicated in the submitted Task Bar Chart.

QAPP ELEMENT 4

PROJECT ORGANIZATION AND RESPONSIBILITY

This element will include the following sections:

1) Management Responsibilities

All managers who will have some responsibility in this project will be stated and their responsibilities will be specifically defined. This includes the facility, their contractors, U.S. EPA, and State management (if applicable).

2) QA Responsibilities

The responsibilities of all QA personnel involved in this project will be stated by position and their responsibilities will be delineated. As part of the detail of this section, the QA personnel responsible for the following will be specified:

a) data validation

b) data assessment

c) internal performance and system audits

3) Field Responsibilities

The responsibility of the field personnel will be outlined in this section. Included in this section will be the person responsible for identifying and documenting nonconformances through corrective action.

4) Laboratory Responsibilities

Laboratory responsibilities will be outlined in this section. This includes stating the location of the laboratory (city and state) and listing the analytes and matrices that will be tested at the laboratory. Any lab staff with responsibility during this project will have those duties stated (e.g. lab sample custodian, etc.).

5) Project Organization Diagram

This diagram will include ALL personnel (no more, no less) discussed in the text and will show the lines of authority and communication.

Examples of the level of detail necessary are provided in the example that follows. Any information inside square brackets ([]) denotes replacing this information with facility and/or contractor-specific names or information.

SECTION 2

PROJECT ORGANIZATION AND RESPONSIBILITY

[The example language for this section includes a wide variety of types of individual responsibilities. In writing a QAPP, you may use or modify whichever of the following examples are applicable to your project.]

At the direction of the [U.S. EPA RCRA Permit Writer/RCRA Project Coordinator(RPC)/State Project Manager], [Contractor] has overall responsibility for all phases of the RFI/CMS. [Contractor/Facility] will perform the field investigation, prepare the RFI report, and perform the subsequent CMS. Project management will also be provided by [Contractor/Facility]. The various quality assurance, field, laboratory and management responsibilities of key project personnel are defined below.

2.1 Project Organization Chart

The lines of authority for this specific project can be found in Figure 2-1. This chart includes all individuals discussed below.

2.2 Management Responsibilities

U.S. EPA RCRA Permit Writer/RCRA Project Coordinator/State Project Manager

The [U.S. EPA RCRA Permit Writer (RPW)/RCRA Project Coordinator (RPC)] has the overall responsibility for all phases of the RFI/CMS. The State Project Manager has overall responsibility for all phases of the RFI/CMS with oversight by the U.S. EPA [RPC/RPW].

[Facility] Project Manager

The [Facility] project manager is responsible for implementing the project, and has the authority to commit the resources necessary to meet project objectives and requirements. The [Facility] manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. The [Facility] project manager will report directly to the [U.S. EPA Region 5 RPW/RPC/State Project Manager] and will provide the major

point of contact and control for matters concerning the project. The [Facility] project manager will:

o Define project objectives and develop a detailed work plan schedule;

o Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task;

o Acquire and apply technical and corporate resources as needed to ensure performance within budget and schedule constraints;

o Orient all field leaders and support staff concerning the project's special considerations;

o Monitor and direct the field leaders;

o Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product;

o Review the work performed on each task to ensure its quality, responsiveness, and timeliness;

o Review and analyze overall task performance with respect to planned requirements and authorizations;

o Approve all reports (deliverables) before their submission to U.S. EPA Region 5;

o Ultimately be responsible for the preparation and quality of interim and final reports; and

o Represent the project team at meetings and public hearings.

[Contractor] Project Manager

The [Contractor] project manager has overall responsibility for ensuring that the project meets U.S. EPA's objectives and [Contractor] quality standards. The [Contractor] project manager will provide assistance to the [Facility] project manager in terms of writing and distributing the QAPP to all those parties connected with the project (including the

laboratory). The [Contractor] project manager will report directly to the [Facility] project manager and is responsible for technical quality control and project oversight.

2.3 Quality Assurance Responsibilities

[Facility] QA Manager

The [Facility] QA manager will remain independent of direct job involvement and day-to-day operations, and have direct access to corporate executive staff as necessary, to resolve any QA dispute. He/she is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations, [Contractor's] policies, and U.S. EPA requirements. Specific functions and duties include:

- Providing QA audit on various phases of the field operations;
- Reviewing and approving of QA plans and procedures;
- Providing QA technical assistance to project staff;
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the program manager and executive vice president for technical operations.

[Contractor] QA Manager

The [Contractor] QA manager reports directly to the [Contractor] project manager and will be responsible for ensuring that all [Contractor] procedures for this project are being followed. In addition, the [Contractor] QA manager will be responsible for the data validation of all sample results from the analytical laboratory.

U.S. EPA Region 5 Quality Assurance Manager (RQAM)

EPA RQAM has the responsibility to review and approve all Quality Assurance Project Plans (QAPPs). Additional U.S. EPA responsibilities for the project include:

- Conducting external Performance and System Audits of RFI Laboratory

o Reviewing and evaluating analytical field and laboratory procedures

2.4 Laboratory Responsibilities

[Laboratory] Project Manager

The [Laboratory] project manager will report directly to the [Contractor] project manager and will be responsible for the following:

- o Ensuring all resources of the laboratory are available on an as-required basis; and
- o Overviewing of final analytical reports.

[Laboratory] Operations Manager

The [Laboratory] operation manager will report to the [Laboratory] Project Manager and will be responsible for:

- o Coordinating laboratory analyses;
- o Supervising in-house chain-of-custody;
- o Scheduling sample analyses;
- o Overseeing data review;
- o Overseeing preparation of analytical reports; and
- o Approving final analytical reports prior to submission to [The Contractor/Facility].

[Laboratory] Quality Assurance Officer

The [Laboratory] QA officer has the overall responsibility for data after it leaves the laboratory. The [Laboratory] QA officer will be independent of the laboratory but will communicate data issues through the [Laboratory] project manager. In addition, the [Laboratory] QA officer will:

- o Overview laboratory quality assurance;
- o Overview QA/QC documentation;
- o Conduct detailed data review;
- o Determine whether to implement laboratory corrective actions, if required;
- o Define appropriate laboratory QA procedures;
- o Prepare laboratory Standard Operation procedures; and
- o Sign the title page of the QAPP.

[Laboratory] Sample Custodian

The [Laboratory] sample custodian will report to the [Laboratory] operations manager. Responsibilities of the [Laboratory] sample custodian will include:

- o Receiving and inspecting the incoming sample containers;
- o Recording the condition of the incoming sample containers;
- o Signing appropriate documents;
- o Verifying chain-of-custody and its correctness;
- o Notifying laboratory manager and laboratory supervisor of sample receipt and inspection;

o Assigning a unique identification number and customer number, and entering each into the sample receiving log;

o With the help of the laboratory manager, initiating transfer of the samples to appropriate lab sections; and

o Controlling and monitoring access/storage of samples and extracts.

Final responsibility for project quality rests with [Contractor's] Project Manager. Independent quality assurance will be provided by the [Laboratory] Project Manager and QA Officer prior to release of all data to [Contractor/Facility].

[Laboratory] Technical Staff

The [Laboratory] technical staff will be responsible for sample analysis and identification of corrective actions. The staff will report directly to the [Laboratory] operations manager.

2.5 Field Responsibilities

[Contractor/Facility] Field Leader

The [Facility] project manager will be supported by the [Facility/Contractor] field team leader. He/she is responsible for leading and coordinating the day-to-day activities of the various resource specialists under his/her supervision. The [Facility/Contractor] field team leader is a highly experienced environmental professional and will report directly to the [Facility] project manager. Specific field team leader responsibilities include:

o Provision of day-to-day coordination with the [Facility] project manager on technical issues in specific areas of expertise;

o Developing and implementing of field-related work plans, assurance of schedule compliance, and adherence to management-developed study requirements;

o Coordinating and managing of field staff including sampling, drilling, and supervising field laboratory staff;

o Implementing of QC for technical data provided by the field staff including field

measurement data;

o Adhering to work schedules provided by the project manager;

o Authoring, writing, and approving of text and graphics required for field team efforts;

o Coordinating and overseeing of technical efforts of subcontractors assisting the field team;

o Identifying problems at the field team level, resolving difficulties in consultation with the [Facility] project manager, implementing and documenting corrective action procedures, and provision of communication between team and upper management; and

o Participating in preparation of the final report.

[Laboratory] On-Site Laboratory Manager [if applicable]

The on-site laboratory manager is responsible for leading and coordinating the day-to-day laboratory activities. Specific on-site laboratory manager responsibilities include:

o Providing day-to-day coordination with the RFI field team leader on technical issues in specific areas of expertise;

o Implementing QC for analytical data;

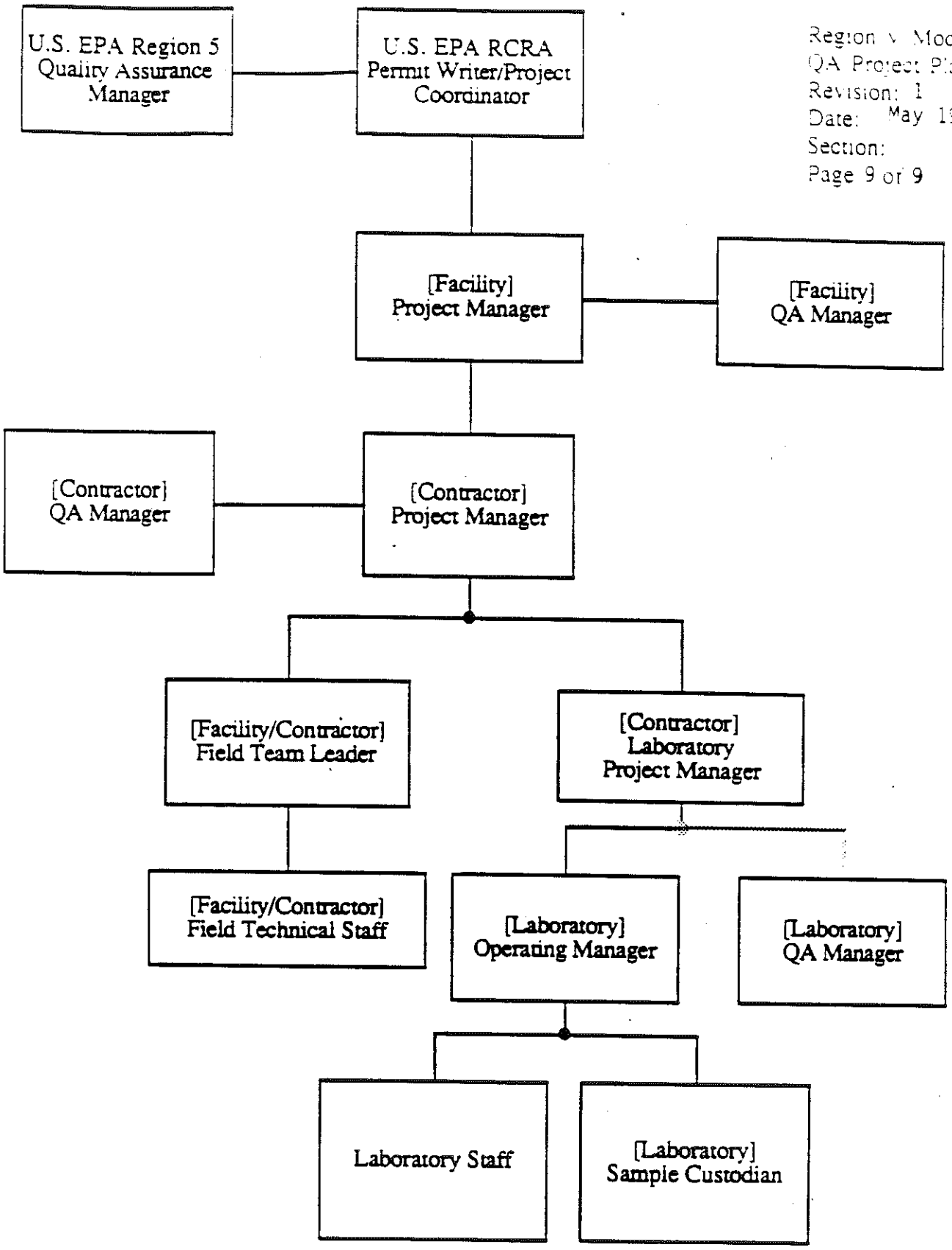
o Identifying problems at the laboratory level and discussing and documenting resolutions with the field team leader.

[Contractor] Field Technical Staff

The technical staff (team members) for this project will be drawn from [Contractors's] pool of corporate resources. The technical team staff will be utilized to gather and analyze data, and to prepare various task reports and support materials. All of the designated technical team members are experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.

[Laboratory] On-Site Lab Staff (if applicable)

The on-site laboratory staff will be responsible for maintaining all aspects of the laboratory to meet the requirements outlined in this QAPP. They will also be responsible for notifying the field team leader when nonconformances are noticed and when corrective action is warranted.



LINE OF AUTHORITY

LINE OF COMMUNICATION

FIGURE 2-1 PROJECT ORGANIZATION DIAGRAM

QAPP ELEMENT 5

QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The purpose of this section is to address project-specific objectives for accuracy, precision, completeness, representativeness, and comparability.

This section will include the following:

1) Discussion of Quantitative QA Objectives

a) Summary Tables

- A table will have the QA limits required for the project (Project Quantitation Limits, PQLs). Also, this table will include the laboratory method detection limits. If this table is presented in the Project Description section, then a reference to that section will be given.

- A table of control limits will be supplied in this section. The control limits for all QC samples (e.g. matrix spikes/matrix spike duplicates, surrogates, etc.) for all analytes to be quantitated will be stated.

b) Precision - The definition for precision and a description of how precision will be assessed for field and laboratory measurements will be presented.

c) Accuracy - The definition for accuracy and a description of how accuracy will be assessed for field and laboratory measurements will be presented.

d) Completeness - The definition of completeness along with the percent of completeness to be obtained for the project will be stated for both field and laboratory analyses.

2) Discussion of Qualitative QA Objectives

a) Representativeness - The measures to be employed to ensure representativeness for field and laboratory measurements will be stated.

b) Comparability - The measures to be employed to ensure comparability for field and laboratory measurements will be stated.

SECTION 3

QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective for this project is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results which are legally defensible in a court of law. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPP.

3.1 Precision

3.1.1 Definition

Precision is a measure of the degree to which two or more measurements are in agreement.

3.1.2 Field Precision Objectives

Field precision is assessed through the collection and measurement of field duplicates at a rate of 1 duplicate per 10 analytical samples. The total number of duplicates for this project are found in [the Appendix to this Model QAPP] of the project description section.

3.1.3 Laboratory Precision Objectives

Precision in the laboratory is assessed through the calculation of relative percent differences (RPD) and relative standard deviations (RSD) for three or more replicate samples. The equations to be used for precision in this project can be found in section 12 of this QAPP. Precision control limits are given in [the Appendix to this Model QAPP] and are referenced to the provided SOPs.

3.2 Accuracy

3.2.1 Definition

Accuracy is the degree of agreement between an observed value and an accepted reference value.

3.2.2 Field Accuracy Objectives

Accuracy in the field is assessed through the use of field and trip blanks and through the adherence to all sample handling, preservation and holding times.

3.2.3 Laboratory Accuracy Objectives

Laboratory accuracy is assessed through the analysis of matrix spikes (MS) or standard reference materials (SRM) and the determination of percent recoveries. The equation to be used for accuracy in this project can be found in section 12 of this QAPP. Accuracy control limits are given in [the Appendix to this Model QAPP] and are referenced to the provided SOPs.

3.3 Completeness

3.3.1 Definition

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions.

3.3.2 Field Completeness Objectives

Field completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project. The equation for completeness is presented in section 12 of this QAPP. Field completeness for this project will be greater than 90 percent.

3.3.3 Laboratory Completeness Objectives

Laboratory completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project. The equation for completeness is presented in section 12 of this QAPP. Laboratory completeness for this project will be greater than 95 percent.

3.4 Representativeness

3.4.1 Definition

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

3.4.2 Measures to Ensure Representativeness of Field Data

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the field sampling plan (FSP) is followed and that proper sampling techniques are used.

3.4.3 Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory is ensured by using the proper analytical procedures, meeting sample holding times and analyzing and assessing field duplicated samples. The sampling network was designed to provide data representative of facility conditions. During development of this network, consideration was given to past waste disposal practices, existing analytical data, physical setting and processes, and constraints inherent to the RCRA program. The rationale of the sampling network is discussed in detail in the field sampling plan (FSP).

3.5 Comparability

3.5.1 Definition

Comparability is an expression of the confidence with which one data set can be

compared with another.

3.5.2 Measures to Ensure Comparability of Field Data

Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the FSP is followed and that proper sampling techniques are used.

3.5.3 Measures to Ensure Comparability of Laboratory Data

Planned analytical data will be comparable when similar sampling and analytical methods are used and documented in the QAPP. Comparability is also dependent on similar QA objectives.

3.6 Level of Quality Control Effort

Field blank, trip blank, method blank, duplicate, standard reference materials (SRM) and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs.

Field and trip blanks consisting of distilled water, will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for procedural contamination at the facility which may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.

Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures. Duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the digestion and measurement methodology. All matrix spikes are performed in duplicate and are hereinafter referred to as MS/MSD samples. One matrix spike/matrix spike duplicate will be collected for every 20 or fewer investigative samples. MS/MSD samples are designated/ collected for organic analyses only.

MS/MSD samples are investigative samples. Soil MS/MSD samples require no extra volume for VOCs or extractable organics. However, aqueous MS/MSD samples must be collected at triple the volume for VOCs and double the volume for extractable organics. One MS/MSD sample will be collected/designated for every 20 or fewer investigative samples per sample matrix (i.e., groundwater, soil).

The general level of the QC effort will be one field duplicate and one field blank for every 10 or fewer investigative samples. One volatile organic analysis (VOA) trip blank consisting of distilled deionized ultra pure water will be included along with each shipment of aqueous VOA samples.

The number of duplicate and field blank samples to be collected are listed in [the Appendix to this Model QAPP]. Sampling procedures are specified in the Field Sampling Plan.

QAPP ELEMENT 6

SAMPLING PROCEDURES

This section will provide detailed, stepwise sampling procedures for each matrix (soil borings, sediment, surface water, groundwater, air, biota, etc.) to be evaluated. A matrix will be defined as a unique stratum which may be solid, liquid, gaseous, animal, or vegetable. Solid matrices may be similar (i.e. soil boring and sediment) but are considered separate matrices. Each sampling procedure will specify:

1) All equipment necessary to sample the matrix,

2) Detailed, "cookbook" procedures to collect investigative samples,

3) Explicit instructions for collecting each applicable type of QC sample for each matrix and associated analytical parameter. These QC samples will include field duplicates, field blanks, trip blanks (for aqueous volatile samples), matrix spike, matrix spike duplicates, etc.,

4) The order of analytical parameter sample fraction collection (i.e. "volatiles first, followed by extractable organics...") for each matrix,

5) Sample containers for each analytical fraction, matrix type, and concentration level. Specifically, the following will be addressed:

    a) The type of container

    b) The container volume

    c) The number of containers required for each analysis

    d) Specific chemical/temperature preservations required

6) Obtaining contaminant-free sample containers. Specifically, the following will be addressed:

    a) Detailed procedures used to prepare contaminant-free sample containers for each container/analytical fraction type,

    b) The criteria all containers must meet (i.e. "benzene $<$ 1 ppb," etc.)

    c) How the criteria are verified and the frequency of the verification (i.e. "{Laboratory} will conduct a GC/MS analysis using CLP OLM01.8 at a frequency of one volatile and semivolatile container perlot of 100 sample containers.")

    d) Who will prepare the containers (i.e. "Containers will be prepared by [Sample Container Company].)"

    e) How the criteria are documented (i.e. "[Sample Container Company] will provide a certified analysis for each sample container lot.")

7) Decontamination procedures for field equipment,

8) Any ancillary procedures such as monitoring well installation or hydropunch work,

9) Sample packaging and shipping procedures to be used as part of the field chain-of-custody procedures since many considerations of sample shipping are integral to custody.

NOTE: If a Field Sampling Plan (FSP) is being prepared, the information to be supplied in the QAPP can be referenced to the FSP. However, the information in the FSP must 1) address ALL requirements stated in this section, 2) provide very detailed information, and 3) provide the specific reference to the FSP where the requested information is located. If these criteria cannot be met by the FSP, then this information must be detailed in this section of the QAPP.

SECTION 4

SAMPLING PROCEDURES

[The following is an example of a sampling procedures section where a Field Sampling Plan (FSP) has been prepared. If a FSP is not prepared, this information must be stated in this section.]

The sampling procedures to be used in this site investigation will be consistent for the purpose of this project. The field sampling plan outlines all the sampling procedure information. Please refer to the following sections and subsections of the FSP for the following information:

- Groundwater Monitoring Well Installation - Section 2.1
- Groundwater Monitoring Well Equipment - Section 2.2
- Groundwater Sampling Procedures - Section 2.3
- Sample Containers - Section 2.4
- Obtaining Contaminant-Free Sample Containers - Section 2.4.1
- QC Sample Procedures - Section 2.5
- Field Blank Collection - Section 2.5.1
- Field Duplicative Collection - Section 2.5.2
- Matrix Spike/Matrix Spike Duplicate Collection - Section 2.5.3
- Trip Blank Preparation - Section 2.5.4
- Groundwater Sampling Equipment Decontamination - Section 2.5.5
- Groundwater Sampling Order - Section 2.5.6

[NOTE: This reference orientation was presented for groundwater only. However, the same referencing would be applied to ALL matrices (i.e. soil, sediments, wipes, fish, etc.)]

QAPP ELEMENT 7

CUSTODY PROCEDURES

Chain of custody is defined as the sequence of persons who have the item in custody. Chain of custody will be demonstrated by documenting that the item in question was always in a state of custody. This will be accomplished through a combination of field and laboratory records that demonstrate possession and transfer of custody.

This section will provide detailed procedures for chain of custody for field activities, laboratory activities, and final evidence files as follows:

1) Field Custody Procedures

Detailed custody procedures will be stated for evidence collected in the field. All documents, logbooks, photographs, measurements, analyses, samples collected, etc. must be addressed in the field custody procedures. Detailed explanations will include:

- Procedures for transfer of custody between individuals.

- A sample numbering system (if not presented in another QAPP section).

- Sample packaging and shipment procedures to an off site laboratory.

- Chronological sequences and instructions for completing all field custody documents as well as copies of each document (as applicable):

i. Field logbooks: The field logbook entry shall provide all information pertinent to the collection of field samples including locations, number/types of samples, measurements, sampling/atmospheric conditions, observations, etc. The field logbook will be a bound volume assigned to an individual field team member. All entries will be completed with a permanent inkpen with no erasures or whiteout used. All entries will be signed/dated. Any entry which is to be deleted shall use a single crossout which is signed/dated.

ii. Sample tags: A sample tag is attached to each individual sample aliquot for each investigative or quality control sample. An example of a U.S. EPA sample tag with instructions for completion is found as a figure appended to this Model QAPP (see

section entitled "chain of custody samples"). At a minimum, the tag will include the field sample number, location (if not already encoded in the sample number), date/time of collection and type of analysis. A space for lab sample number (provided by the lab upon log-in) is also required.

A sample tag may be attached to the sample container with a wire around the container neck through a reinforced hole in the tag. All tag entries are made with a waterproof, permanent ink.

While sample **labels** (described below) may be used in addition to tags, **tags must always be used whenever chain of custody is required!** The sample tag is the only physical evidence of the sample aliquot as carried through the entire custody process outside of keeping all sample containers. Sample labels cannot usually be removed intact and often do not include enough space for information on smaller containers. Sample tags allow for disposal of sample containers once the samples have exceeded their holding times.

iii. Sample labels: As noted above, sample labels are optional when chain-of-custody is required. Sample labels may repeat some of the information provided on tags but usually cannot be removed intact.

iv. Chain of custody record form: A chain-of custody record form is the form used to record information pertinent to all samples being shipped in the same cooler. In general, the form will record samples which may be shipped together (i.e. extractable organics or metals) to the same laboratory. The form will also include spaces for transfers of custody by the field team as well as for log-in by the lab sample custodian.

v. Shipping cooler custody seals: Shipping cooler custody seals are placed on the edges of the cooler between the lid and sides to determine whether coolers may have been tampered with. The custody record form, along with all associated samples/tags, preservative (i.e., ice) and packing material are placed in the cooler prior to sealing with one or more seals.

vi. Airbills: Airbills used by the shipping company are often overlooked in the custody chain. Airbills are the only means to document and ensure continuity in custody between the shipment of samples from the field until their arrival at the

laboratory. Copies of all completed airbills must be included as part of the final custody documentation.

2) Laboratory Custody Procedures

Detailed laboratory custody procedures specific to each laboratory associated with the project will be stated. The RCRA facility and its field contractor must ensure continuity between field and lab custody procedures. Laboratory custody procedures will:

- begin when samples are received by the laboratory.

- maintain the chain of custody initiated in the field.

- provide the chronological sequence from sample log-in through sample analysis and disposal.

- provide detailed log-in procedures.

- detail the internal sample tracking and numbering systems.

- identify the sample custodian.

- detail transfers of custody within the laboratory.

- provide examples of internal custody documents (with instructions for completion).

- specify how and where samples are stored.

- specify how and when samples, extracts, and digestates are disposed.

- specify how custody of analytical data are maintained.

- specify how analytical data and custody records are "purged" from the custody of the lab to the final evidence file.

3) Final Evidence Files: This section will specify:

- the contents of the final evidence file.

- the identification of the file custodian.

- the location where the file will be maintained in a secure, limited access area.

- the length of time (as mandated by U.S. EPA) that the file will be maintained. This may be specified in an order, etc.

The file must be offered to U.S. EPA prior to disposal.

SECTION 5

CUSTODY PROCEDURES

Custody is one of several factors which is necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area.

A sample or evidence file is under your custody if:

* the item is in actual possession of a person; or

* the item is in the view of the person after being in actual possession of the person; or

* the item was in actual physical possession but is locked up to prevent tampering; or

* the item is in a designated and identified secure area.

5.1 FIELD CUSTODY PROCEDURES

Field logbooks will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the facility could reconstruct a particular situation without reliance on memory.

Field logbooks will be bound, field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use. Each logbook will be identified by the project-specific document number.

The title page of each logbook will contain the following:

* Person to whom the logbook is assigned.

* Logbook number.
* Project name.
* Project start date, and
* End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink, signed, and dated and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark which is signed and dated by the sampler. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station, which includes compass and distance measurements, shall be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration.

Samples will be collected following the sampling procedures documented in Section ____ of this QAPP. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume and number of containers. Sample identification number will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description.

The sample packaging and shipment procedures summarized below will ensure that the samples will arrive at the laboratory with the chain of custody intact. The protocol for specific sample numbering using case numbers and traffic report numbers if applicable and other sample designations are included in Section _____ of this QAPP. Examples of field custody documents and instructions for completion are

presented in [Appendix to this Model QAPP].

a) The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As FEW people as possible should handle the samples.

(b) All bottles will be identified by use of sample tags with sample numbers, sampling locations, date/time of collection, and type of analysis. The sample numbering system is presented in section ____ of this QAPP.

(c) Sample tags are to be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because the ballpoint pen would not function in freezing weather.

d) Samples are accompanied by a properly completed chain of custody form. The sample numbers and locations will be listed on the chain of custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage area.

(e) Samples will be properly packaged on ice at 4°C for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. Shipping containers will be locked and secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.

(f) Whenever samples are collocated with a government agency, a separate sample receipt is prepared for those samples and marked to indicate with whom the samples are being collocated. The person relinquishing the samples to the facility or agency should request the representatives signature acknowledging sample receipt. If the

representative is unavailable or refuses to sign, this is noted in the "Received By" space.

(g) All shipments will be accompanied by the Chain of Custody Record identifying the contents. The original record will accompany the shipment, and the pink and yellow copies will be retained by the sampler for returning to the sampling office.

(h) If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

(i) Samples will be transported to the laboratory the same day the samples are collected in the field by overnight carrier.

5.2 LABORATORY CUSTODY PROCEDURES

Laboratory custody procedures for sample receiving and log-in; sample storage and numbering; tracking during sample preparation and analysis; and storage of data are described in the [Laboratory] procedures in the appendix. Examples of laboratory chain of custody traffic reports along with instructions for completion are [included in the Appendix to this Model QAPP]. **[This laboratory information can be attached to the QAPP as an appendix and referenced. Otherwise, please list the procedures here.]**

5.3 FINAL EVIDENCE FILES

The final evidence file will be the central repository for all documents which constitute evidence relevant to sampling and analysis activities as described in this QAPP. [Contractor] is the custodian of the evidence file and maintains the contents of evidence files for the RFI, including all relevant records, reports, logs, field notebooks, pictures, subcontractor reports and data reviews in a secured, limited access area and under custody of the [Contractor] facility manager.

The final evidence file will include at a minimum:

- field logbooks

- field data and data deliverables

- photographs

- drawings

- soil boring logs

- laboratory data deliverables

- data validation reports

- data assessment reports

- progress reports, QA reports, interim project reports, etc.

- all custody documentation (tags, forms, airbills, etc.)

QAPP ELEMENT 8

CALIBRATION PROCEDURES AND FREQUENCY

This section will include a description of the calibration procedures and the frequency with which these procedures will be performed for both field and laboratory instruments. This section will include the following:

1) Field Instrument Calibration

- Initial calibration
- Continuing calibration

2) Laboratory Instrument Calibration

- Initial calibration for each instrument, 3 or 5 point calibration **[NOTE: The ICP only requires a 2-point initial calibration.]**
- Initial calibration verification
- Continuing calibration

Each calibration procedure will also include the acceptance criteria and the conditions that will require recalibration. The accuracy and traceability of the calibration standards used must be properly documented.

[NOTE: The SOPs for all the analyses that will be performed on the samples collected for this RFI will include a section on instrument calibration if the format described in "*Guidelines For The Preparation of Standard Operating Procedures (SOPs) For Field and Laboratory Measurements*" was followed. For details, refer to section 7 instructions page.]

[NOTE: Any deviation from the SOP must be explained and justified in this section. It must be specified whether the deviation to the SOP is only temporary for the purpose of this facility investigation. Otherwise, if the deviation is permanent, then the SOP will have to be revised and resubmitted to the EPA.]

SECTION 6

CALIBRATION PROCEDURES AND FREQUENCY

This section describes the calibration procedures and the frequency at which these procedures will be performed for both field and laboratory instruments.

6.1 Field Instrument Calibration

The field instruments will be calibrated as described in field SOPs. Field instruments include a pH meter, potentiometer for Eh measurement, thermometer, nephelometer, conductivity meter, field GC system, organic vapor analyzer (OVA) or organic vapor photoionization detector (PID). As a rule, instruments will be calibrated daily prior to use and will be recalibrated every **[number]** samples. For specific instructions on the calibration frequency, the acceptance criteria and the conditions that will require more frequent recalibration, refer to the specific SOPs for each field analysis.

The linearity of the instrument will be checked by using a 2-point calibration with reference standards bracketing the expected measurement. All the calibration procedures performed will be documented in the field logbook and will include the date/time of calibration, name of person performing the calibration, reference standard used, temperature at which readings were taken and the readings. Multiple readings on one sample or standard, as well as readings on replicate samples, will likewise be documented.

[The following example calibration procedures for standard field measurements are acceptable and may be inserted verbatim into individual facility investigations QAPP, if applicable. The SOPs for these field measurements may also be referenced. Field instruments may vary by manufacturer in which case the instruction or operating manual should serve as a guide in preparing SOPs.]

pH Meter Calibration

The pH meter will be calibrated with standard buffer solutions before being taken to the field. In the field, the meter will be calibrated daily with two buffer solutions before use. The range of the buffer solutions will be at least three or more pH units apart and will bracket the expected pH of the sample being measured.

* Ensure that the temperature of sample and buffer are the same.

* Connect pH electrode into pH meter and turn on pH meter.

* Set temperature setting based on the temperature of buffer, place electrode in first buffer solution.

* After reading has stabilized, adjust "CALIB" knob to display correct value.

* Repeat procedure for second buffer solution.

* Place pH electrode in the sample and record the pH as displayed.

* Remove pH electrode from sample and rinse off with distilled water.

* Recalibrate the pH meter every time it is turned off and turned back on, or if it starts giving erratic results.

Thermometer Calibration

Temperature readings will be taken using thermometers which have been compared to NIST traceable thermometer. Prior to use, the thermometers will be inspected to ensure that there is no mercury separation and will be periodically checked in the field. The thermometers used will be calibrated against a NIST traceable reference thermometer by immersing both thermometers in a bath of an expected known temperature such as freezing (0 degrees C) or boiling (100 degrees C) and comparing the readings. If the error is more than **[QC limit in percent]**, then the thermometer should be discarded and replaced.

Conductivity Meter Calibration

The conductivity cells of the specific conductivity meter will be cleaned and checked against known conductivity standards before being taken to the field. In the field, the instrument will be checked daily with NIST **[or other approved sources]** traceable reference standards. The calibration procedure is described below.

* Place the probe in the conductivity calibration standard solution.

* Set temperature knob for temperature of standard solution.

* Turn to appropriate scale and set the instrument for the value of calibration standard.

* Rinse off the electrode with distilled water.

* Measure the conductivity for distilled water to be used for a field blank, making sure temperature is set correctly for temperature of solution to be tested.

* If the conductivity of blank (distilled water) is high, it must be discarded and a new blank sample obtained.

Organic Vapor analyzer (OVA), Organic Vapor Photoionization Detector (OV-PID) and HNU GC

The OVA will be checked daily by use of the internal calibration mechanism. The OV-PID will be calibrated daily with **[calibration gas, for example: methane]** of known concentration.

Geophysical Instrument Calibration

The calibration procedures and their frequency for geophysical instruments such as magnetometer, electromagnetic conductivity meter and ground penetrating radar equipment are described in an SOP.

6.2 Laboratory Instrument Calibration

Calibration procedures for a specific laboratory instrument will consist of initial calibration (3 or 5-points), initial calibration verification and continuing calibration verification. For a description of the calibration procedures for a specific laboratory instrument, refer to the applicable SOPs in [the Appendix to this Model QAPP] of this QAPP. The SOP for each analysis performed in the laboratory describes the calibration procedures, their frequency, acceptance criteria and the conditions that will require recalibration. In all cases, the initial calibration will be verified using an independently prepared calibration verification solution. **[NOTE: Any deviation from the SOP must be explained and justified in this section. It must be specified whether the deviation to the SOP is only temporary for the purpose of this facility investigation. Otherwise, if the deviation is permanent, then the SOP will have to be revised and resubmitted to the EPA.]**

The laboratory maintains a sample logbook for each instrument which will contain the following information: instrument identification, serial number, date of calibration, analyst, calibration solutions run and the samples associated with these calibrations.

QAPP ELEMENT 9

ANALYTICAL PROCEDURES

This section will describe the field and laboratory analytical procedures to be used for the site investigation. Field analytical procedures are those procedures which generate analytical data to be used in a decision-making process involved with sample selection or site screening (e.g. field screening with a GC to determine particular constituent concentrations). Laboratory analytical procedures include organic and inorganic constituents as well as characteristic matrix concentrations (e.g. BOD, COD, TOC, TOX, TPH, etc.). These procedures will provide information for the purpose of meeting defined project objectives.

The following information will be stated in this section:

1) The analytical parameters and matrices to be tested will be stated for each laboratory involved in the project. Each laboratory address will be stated in this section of the QAPP. A reference to the specific section in QAPP Section 2 (Lab Responsibilities) is acceptable to satisfy this requirement.

2) Standard Operating Procedures for sample preparation (i.e. extraction, concentration, etc., for organics; digestion, dilutions, etc., for inorganics) and cleanup methods, for all types of matrices, if not included in the determinative SOPs will be stated in this section of the QAPP. Determinative SOPs are those that describe the qualitative/quantitative analysis of specific analyte groups which, may or may not include the sample preparation and cleanup of the extracts. For example, in *The Test Methods for Evaluating Solid Waste (SW-846)*, the sample preparation and cleanup methods are cited independent of the determinative instrumental methods.

3) Standard Operating Procedures (SOPs) for all analyses that will be performed on the samples collected from the site under investigation will be stated. The SOPs may be based on SW-846, or other EPA methods, such as those promulgated under the Clean Water Act (e.g. EPA 600 Series Organic Methods) and Safe Drinking Water Act (e.g. EPA 500 Series Methods) provided that the methods are sufficient to meet any defined project objectives. Some SOPs for inorganic analysis will be based on EPA-600/4-79-020 *"Method for Chemical Analysis of Water and Wastes"*. The SOPs must be detailed and specify analytes and matrices of interest for this RCRA investigation. Pertinent sections of the equivalent SW-846 method may be referenced in the SOP, but need not be included if these sections are followed without modification. If any referenced sections offer several options, the option selected must be clearly stated. To the extent possible, all SOPs should follow a definite format as described in the attached EPA Region 5 document *"Guidelines For the Preparation of Standard Operating Procedures (SOPs) For Field And Laboratory Measurements"* which is included in the Appendix to this Model QAPP.

4) Standard Operating Procedures to be used for confirmatory analysis of detected compounds, if applicable, will be stated in this section. The basis for these SOPs will be the EPA SW-846, 600 or 500 Series Methods, as stated earlier. For example, if a compound determined by GC/EC will be confirmed using a different detector system (such as FID, NPD, MS, etc.), then the SOP will have to be included in the QAPP.

5) An explanation of how the method validation study (including detection limit study) was conducted. This should be based on the laboratory SOPs and must include the criteria for acceptance, rejection or qualification of data.

6) Summary tables of analyte groups of interest (e.g. volatiles, acid/base/neutrals, metals, nutrients, etc.), including the appropriate laboratory SOP numbers and EPA method reference shall be included in this section. For each analyte group on a matrix-specific basis, all the applicable sample preparation, cleanup and analysis SOPs will be included in a table format. In addition, list each of the project target compounds in each analyte group that will be measured and reported.

7) The quantities and types of QC samples to be taken for each analyte group, on a matrix-specific basis will be included in this section. This list will reflect the specific needs of the project. The laboratory SOP will have a QC section which addresses minimum QC requirements. However, any additional project requirements will be addressed. (NOTE: Pertinent sections of the QAPP may be referenced.)

NOTE: The SOPs and method validation studies will be sent under separate cover. The SOPs and method validation study will be submitted along with the QAPP and will be referenced as an attachment in the document but will be spatially distinct from the QAPP to facilitate laboratory audit procedures.

SECTION 7

ANALYTICAL PROCEDURES

Groundwater samples and residential well water samples collected during field sampling activities for the **[Facility]** RFI will be analyzed by the **[First Laboratory name, address and telephone number]**. Soil samples collected will be analyzed by **[Second Laboratory name, address, and telephone number]**.

7.1 Field Analytical Procedures

The standardization and QA information for field measurements of pH, Eh, specific conductivity, and temperature are described in Section 3 of this QAPP. A copy of the Field Sampling Plan has been submitted with the QAPP to expedite review and approval of these methods. The SOP for the GC field screening procedure to be used during this investigation is presented as an SOP.

7.2 Laboratory Analytical Procedures

The laboratories named above will implement the project required Standard Operating Procedures (SOPs). These laboratory SOPs for sample preparation, cleanup and analysis are based on SW-846 Revision **[Revision Number and Date]** and **[other EPA methods, such as 600 Series or 500 Series Methods]**. These SOPs provide sufficient details and are specific to this RCRA facility investigation.

The site samples for volatile organic compounds analysis (VOA) shall be screened in the laboratory, as described in the VOA SOP and shall be analyzed, either as low or medium level concentration samples, or as a series of dilutions in order to cover the expected concentration range of the site-specific compounds of interest.

The site soil sample extracts requiring pesticide/PCB and/or semivolatile organic compounds analysis (acid/base/neutral analysis or ABNs) shall be subjected to gel permeation chromatography cleanup and/or other column chromatography cleanup, as necessary.

For confirmatory analysis of **[compounds of interest]**, SOP number **[Laboratory SOP number]** based on **[SW-846 method number]** will be performed.

The documentation of appropriate method validation for the project target compounds is submitted in [the Appendix to this Model QAPjP]. It includes the criteria for acceptance, rejection or qualification of data.

Tables 7.1 and 7.2 summarize the analyte groups of interest, appropriate laboratory SOP numbers and EPA reference method for the organic and inorganic analytes, respectively, to be evaluated in this investigation. The [Laboratory] SOPs to be used in this investigation have been (submitted as a separate document). **[NOTE: This table is only an example. The actual table will reflect the analytical requirements of the project.]**

7.2.1 List of project target compounds and laboratory detection limits

A complete listing of project target compounds, project quantitation limits, and current laboratory determined detection limits for each analyte group listed in Table 7.1 can be found in Section __ of this QAPP. Method detection limits shown have been experimentally determined using the method found in FR vol. 49, no. 209, page 198-199.**[NOTE: These detection limits and method of determination are essential and must be presented in the QAPP.]**

7.2.2 List of associated QC samples

The laboratory SOPs include a QC section which addresses the minimum QC requirements for the analysis of specific analyte groups. Since **[analyte 1, analyte 2, etc.]** have been found in a **[previous investigation type]** at **[concentrations]**, these compounds will be added to the spiking solution, in compliance with project requirements. Section __ of this QAPP contains a complete listing of the associated QC samples for every analyte group and matrix.

[NOTE: The following tables are examples only. The SOPs are examples of a naming convention which includes the basis for the SOP.]

TABLE 7.1

SUMMARY OF ORGANIC ANALYTICAL PROCEDURES

Analyte Group*	Lab. SOP No.	Equivalent EPA Method Number[a]
Matrix: Water		
Volatile Organics	SOP.01B8240/86 (Analysis)	8240
Semivolatiles	SOP.02B3510/86 (Sample Prep)	3510
	SOP.03B3640/86 (Cleanup/GPC)	3640
	SOP.04B8270/86 (Analysis)	8270
Matrix: Soil		
Pesticides/PCBs	SOP.05B3540/86 (Sample Prep/Soxhlet)	3540
	SOP.06B3640/86 (Cleanup/GPC)	3640
	SOP.07B3620/86 (Cleanup/Florisil)	3620
	SOP.08B3660/86 (Cleanup/Sulfur**)	3660
	SOP.09B8080/86 (Analysis***)	8080

[NOTE: The following are example notes on the options selected, where several options exist in the SOP.]

* See 7.2.1 for compounds in each analyte group.
** Sulfur cleanup will be done using mercury.
*** Pesticide/PCB analysis using dual, dissimilar megabore columns.
[a]SW-846, Third Edition

TABLE 7.2

SUMMARY OF INORGANIC ANALYTICAL PROCEDURES

Analyte*	Lab. SOP No.	Equivalent EPA Method Number[b]
Matrix: Water		
Arsenic	SOP.01B3020/86 (Digestion) SOP.01B7060/86 (Analysis)	3020 7060
Antimony	SOP.02B3005/86 (Digestion) SOP.03B7041/86 (Analysis)	3005 7041
Lead	SOP.04B3010/86 (Digestion) SOP.05B6010/88 (Analysis)	3010 6010
Sulfide	SOP.06B9030/88 (Analysis)	9030
Matrix: Soil		
Arsenic	SOP.01B3050/86 (Digestion) SOP.01B7060/86 (Analysis)	3050 7060
Antimony	SOP.02B3050/86 (Digestion) SOP.03B7041/86 (Analysis)	3050 7041
Lead	SOP.04B3050/86 (Digestion) SOP.05B6010/88 (Analysis)	3050 6010
Sulfide	SOP.06B9030/88 (Analysis)	9030[a]

[NOTE: The following are example notes on the options selected, where several options exist in the SOP.]

* See 7.2.1 for compounds in each analyte group.

[a]Modified to add soil digestion procedure; See SOP in separate attachment (Attachment _)

[b]SW-846, Third Edition

QAPP ELEMENT 10

INTERNAL QUALITY CONTROL CHECKS

This section describes all specific quality control checks to be addressed for both field and laboratory analysis in order to comply with the requirements of the project investigation. It will include, but not be limited to, the following information:

Field Quality Control Checks

- Replicate measurements per sample (if applicable)
- Duplicate samples
- Reference standards (used in calibrating field instruments such as pH meters, specific conductance or conductivity meters, potentiometer for Eh measurements, HNU GC for organics, etc.)
- For temperature measurements, thermometer is compared with NIST traceable thermometer
- Reference standards for turbidity measurements (Nephelometric method, etc.)
- Munsell color chart for color checks

Laboratory Quality Control Checks

- Field/Trip blanks
- Method blanks
- Reagent/preparation blanks (applicable to inorganic analysis)
- Instrument blanks
- Matrix spikes/matrix spike duplicates
- Surrogate spikes
- Analytical spikes (Graphite furnace)
- Field duplicates
- Laboratory duplicates
- Laboratory control standards
- Internal standard areas for GC/MS analysis; control limits
- Mass tuning for GC/MS analysis
- Endrin/DDT degradation checks for GC/EC analysis
- Second, dissimilar column confirmation for GC/EC analysis

The required laboratory SOPs **[NOTE: Refer to Section 7 instructions page]** will include a QC section which describes the specific QC requirements for the method.

SECTION 8

INTERNAL QUALITY CONTROL CHECKS

8.1 Field Quality Control Checks

QC procedures for pH, Eh, specific conductance, temperature and turbidity measurements of water samples will include calibrating the instruments as described in Section 6.0 of the QAPP, measuring duplicate samples and checking the reproducibility of the measurements by taking multiple readings on a single sample or reference standard. The QC information for field equipment is stated in section 3.0 of this QAPP. The thermometer used will be compared to a NIST traceable thermometer (or equivalent). Soil color checks, if required, will be done using Munsell color charts. Assessment of field sampling precision and bias will be made by collecting field duplicates and field blanks for laboratory analysis. Collection of the samples will be in accordance with the applicable procedures in section **[Section Number]** of the Field Sampling Plan (FSP) at the frequency indicated in [the Appendix to this Model QAPP].

8.2 Laboratory Quality Control Checks

The laboratory identified in Section 7 of this QAPP has a QC program it uses to ensure the reliability and validity of the analysis performed at the laboratory. All analytical procedures are documented in writing as SOPs and each SOP includes a QC section which addresses the minimum QC requirements for the procedure. The internal quality control checks might differ slightly for each individual procedure but in general the QC requirements include the following:

- Field/Trip blanks
- Method blanks
- Reagent/preparation blanks (applicable to inorganic analysis)
- Instrument blanks
- Matrix spikes/matrix spike duplicates
- Surrogate spikes
- Analytical spikes (Graphite furnace)
- Field duplicates
- Laboratory duplicates

- Laboratory control standards
- Internal standard areas for GC/MS analysis; control limits
- Mass tuning for GC/MS analysis
- Endrin/DDT degradation checks for GC/EC analysis
- Second, dissimilar column confirmation for GC/EC analysis

For a description of the specific QC requirements of this facility investigation and the frequency of audit, refer to the submitted SOPs. The QC criteria are also included in the SOPs.

All data obtained will be properly recorded. The data package will include a full deliverable package capable of allowing the recipient to reconstruct QC information and compare it to QC criteria. Any samples analyzed in nonconformance with the QC criteria will be reanalyzed by the laboratory, if sufficient volume is available. It is expected that sufficient volumes/weights of samples will be collected to allow for reanalysis when necessary.

QAPP ELEMENT 11

DATA REDUCTION, VALIDATION, AND REPORTING

The project plans for reducing data, validating data, and reporting data, for both field and laboratory activities will be explained in this section of the QAPP. Data reduction is the process of converting raw analytical data to final results in proper reporting units. In most cases, data reduction will be primarily concerned with the equation used to calibrate results. Data validation is the process of qualifying analytical/measurement data on the performance of the field and laboratory quality control measures incorporated into the sampling and analysis procedures. Data reporting is the detailed description of the data deliverables used to completely document the analysis, calibration, quality control measures and calculations. Individuals responsible for implementing data reduction, validation, and reporting for the project will be identified in this section of the QAPP.

For **field activities**, data reduction, validation, and reporting must be tailored to the nature of the instrumentation being utilized. For direct reading instruments, (e.g. pH meters, thermometers), where no calculations are involved, there will ordinarily be no data reduction. Therefore, the QAPP may simply state that there is no calculation involved. In order to address data validation for direct reading instruments, it must be ensured that transcription errors have not occurred as data are copied from log books to results forms. Also, there should be review of field logs to ensure that calibration was done as defined in the SOP. Field data are usually reported through report summary sheets tabulating results and field logbooks which document calibrations.

However, for field analytical instruments where data reduction may be necessary, such as in the case of a field gas chromatograph, the level of information concerning data reduction, validation, and reporting must be comparable to that required for laboratory instrumentation, as discussed below.

For **laboratory activities**, the following items must be addressed in this section:

A. DATA REDUCTION

1. Analytical procedures will contain the equation(s) used to calculate results. It may be acceptable to reference applicable section(s) of analytical SOPs where equations may be found.

2. Reduction procedures (as well as analytical procedures) must include the equations applicable for each matrix to be analyzed.

B. DATA VALIDATION

1. Sampling and analysis procedures must be complete to prepare and review a validation procedure.

2. Validation procedure must specify the verification process of every quality control measure used in the field and laboratory.

3. A 100% laboratory data validation must be performed by an entity independent of the laboratory, (i.e., engineering firm or laboratory's corporate QA officer).

4. A validation procedure should be prepared for each analytical procedure.

5. The U.S. EPA Functional Guidelines are only directly applicable to Contract Laboratory

Program Statements of Work, CLP-SOWs, low/medium analyses. For SW846 and other analytical methods, this guidance document can be used to construct the validation procedures for these methods.

6. All qualifiers used in the validation report as well as the contents of the validation report must be defined.

7. As outlined below, a "CLP-like" data deliverables package documenting analyses is necessary for a complete validation.

C. DATA REPORTING

1. Data deliverables should completely document the analysis (i.e. recreate the analysis on paper).

2. Data deliverables should be based upon the method.

3. The QAPP should provide a listing of data deliverables and examples of forms that will be used to tabulate the information. An example of a data deliverables package is found in the CLP-SOWs, exhibits B and C.

4. CLP-SOW deliverables are only directly applicable to CLP-SOW analyses. All other analyses require listing/examples.

5. Data deliverables are necessary for complete data validation.

6. Hardcopy data deliverables should be generated at the time of analysis and not "available upon request". At a minimum, one complete "CLP-like" data package (for all samples) must be delivered to the facility, to be made available to the U.S. EPA immediately upon request.

7. Typical data deliverables typically include, (but are not necessarily limited to):

   i. case narrative
   ii. calibration (initial/continuing) summary and raw data
   iii. mass spectrometer tuning data
   iv. gas chromatograms
   v. mass spectra
   vi. quality control summary forms and raw data
   vii. ICP, AA and graphite furnace data outputs
   viii. interelement correction data
   ix. blank data results
   x. method and instrumental detection limit results

An example of a section addressing this QAPP element is presented in the following example.

SECTION 9

DATA REDUCTION, VALIDATION, AND REPORTING

All data generated through in field activities, or by the laboratory operation shall be reduced, and validated prior to reporting. No data shall be disseminated by the laboratory until it has been subjected to these procedures which are summarized in subsections below:

9.1 Data Reduction

9.1.1 Field data reduction procedures

Field data reduction procedures will be minimal in scope compared to those implemented in the laboratory setting. Only direct read instrumentation will be employed in the field. The use of pH meters, thermometers, an OVA, and a probe to measure specific conductance will generate some measurements directly read from the meters following calibration per manufacturer's recommendations as outlined in section 6 of this QAPP. Such data will be written into field log books immediately after measurements are taken. If errors are made, results will be legibly crossed out, initialed and dated by the field member, and corrected in a space adjacent to the original (erroneous) entry. Later, when the results forms required for this study are being filled out, the Field Manager, identified in Section 2 of this QAPP, will proof the forms to determine whether any transcription errors have been made by the field crew.

Because the use of field instrumentation such as a mobile gas chromatograph will not be used until a later phase of the study has been reached, there will be no further need for assuring that field data has been reduced properly through the use of formulas or interpretation of raw data printouts. Later, when the Corrective Measures Implementation phase has begun, this QAPP will be modified to incorporate the use of the field gas chromatograph and any associated field data reduction procedures which may be relevant.

9.1.2 Laboratory data reduction procedures

Laboratory data reduction procedures will be followed according to the following protocol. All raw analytical data will be recorded in numerically identified laboratory

notebooks. These notebooks will be issued only by the Laboratory QA Manager. Data are recorded in this notebook along with other pertinent information, such as the sample identification number and the sample tag number. Other details will also be recorded in the lab notebook, such as the analytical method used (SOP#), name of analyst, the date of analysis, matrix sampled, reagent concentrations, instrument settings, and the raw data. Each page of the notebook shall be signed and dated by the analyst. Copies of any strip chart printouts (such as gas chromatograms) will be maintained on file. Periodic review of these notebooks by the Lab QA Manager takes place prior to final data reporting. (Records of notebook entry inspections are maintained by the Lab QA Manager.)

For this project, the equations that will be employed in reducing data are those associated with the CLP-SOW (Multi-Media, Multi-Concentration Contractural Requirements and Equations For Volatile Data Review OLM01.1, December, 1990, Appendix A). (Two of these equations, expressing analytical accuracy and precision, have been presented in section 12 of this QAPP.) Such formulae make pertinent allowances for matrix type. All calculations are checked by the Organic Section supervisor at the conclusion of each operating day. Errors are noted, corrections are made, but the original notations are crossed out legibly. Analytical results for soil samples shall be calculated and reported on a dry weight basis, and TCLP results will not be matrix spike recovery-corrected.

Quality control data (e.g. laboratory duplicates, surrogates, matrix spikes, and matrix spike duplicates) will be compared to the method acceptance criteria. Data considered to be acceptable will be entered into the laboratory computer system. Data summaries will be sent to the Laboratory QA Manager for review. If approved, data are logged into the project database format. Unacceptable data shall be appropriately quaified in the project report. Case narratives will be prepared which will include information concerning data that fell outside acceptance limits, and any other anomalous conditions encountered during sample analysis. After the Lab QA Manager approves these data, they are considered ready for third party data validation.

9.2 Data Validation

Data validation procedures shall be performed for both field and laboratory operations as described below:

9.2.1 Procedures Used to Evaluate Field Data

Procedures to evaluate field data for this project primarily include checking for transcription errors and review of field log books, on the part of field crew members. This task will be the responsibility of the Field Manager, who will otherwise not participate in making any of the field measurements, or in adding notes, data or other information to the log book.

9.2.2 Procedures to Validate Laboratory Data

Procedures to validate laboratory data will be derived exclusively from the U.S. EPA's Contract Laboratory Program, National Functional Guidelines For Organic Data Review, Multi-Media, Multi-Concentration (OLMO1.O) and Low Concentration Water (OLCO1.O), December, 1990. Essentially, all technical holding times shall be reviewed, the GC/MS instrument performance check sample results shall be evaluated, results of initial & continuing calibration will be reviewed and evaluated by trained reviewers independent of the laboratory. (The role of the Data Validators is indicated in the Project Organization (Section 2) of this QAPP.) Also, results of all blanks, surrogate spikes, matrix spikes/matrix spike duplicates, laboratory control samples, internal standards, target compound identification & quantitation, tentatively identified compounds, system performance checks shall be performed for volatile organic compounds by the Data Validator. Additionally, a method detection limit study will be performed, at the request of the U.S. EPA per the provisions of Federal Register, Vol. 49, no. 209, October 26, 1984, pp.198-199, shall be conducted. The results shall also be validated. One hundred percent of the data shall be validated.

All CLP forms summarizing this information will be checked as well. The overall completeness of the data package will also be evaluated by the Data Validator. Completeness checks will be administered on all data to determine whether deliverables specified in the RFI Workplan and QAPP are present. At a minimum, deliverables will include sample chain-of-custody forms, analytical results, QC summaries, and supporting raw data from instrument printouts. The reviewer will determine whether all required items are present and request copies of missing deliverables.

[NOTE: This is a data validation example for organic analysis. A similar process will be outlined for inorganic analyses and general parameters (i.e. fluoride, chloride, sulfate, etc.)]

9.3 Data Reporting

Data reporting procedures shall be carried out for field and laboratory operations as indicated below:

9.3.1 Field Data Reporting

Field data reporting shall be conducted principally through the transmission of report sheets containing tabulated results of all measurements made in the field, and documentation of all field calibration activities.

9.3.2 Laboratory Data Reporting

The task of reporting laboratory data (to the U.S. EPA) begins after the validation activity has been concluded. The Laboratory QA Manager must perform a final review of the report summaries and case narratives to determine whether the report meets project requirements. In addition to the record of chain-of-custody, the report format shall consist of the following:

1. Case Narrative:

   i. Date of issuance
   ii. Laboratory analysis performed
   iii. Any deviations from intended analytical strategy
   iv. Laboratory batch number
   v. Numbers of samples and respective matrices
   vi. Quality control procedures utilized and also references to the acceptance criteria
   vii. Laboratory report contents
   viii. Project name and number
   ix. Condition of samples 'as-received'
   x. Discussion of whether or not sample holding times were met
   xi. Discussion of technical problems or other observations which may have created analytical difficulties
   xii. Discussion of any laboratory quality control checks which failed to meet project criteria
   xiii. Signature of the Laboratory QA Manager

2. Chemistry Data Package

   i. Case narrative for each analyzed batch of samples
   ii. Summary page indicating dates of analyses for samples and laboratory quality control checks
   iii. Cross referencing of laboratory sample to project sample identification numbers
   iv. Data qualifiers to be used should be adequately described
   v. Sample preparation and analyses for samples
   vi. Sample results
   vii. Raw data for sample results and laboratory quality control samples
   viii. Results of (dated) initial and continuing calibration checks, and GC/MS tuning results
   ix. Matrix spike and matrix spike duplicate recoveries, laboratory conrol samples, method blank results, calibration check compoounds, and system performance check compound results
   x. Labelled (and dated) chromatograms/spectra of sample results and laboratory quality control checks
   xi. Results of tentatively identified compounds

The data package submitted will be a "CLP-like" data package consisting of all the information presented in a CLP data package (but without the CLP forms).

QAPP ELEMENT 12

PERFORMANCE AND SYSTEMS AUDITS

The purpose of performance and system audits is to verify that the quality assurance/quality control programs are strictly followed by the appropriate personnel during the field activities (e.g. sample collection, preservation, and transportation) and laboratory activities (e.g. sample preparation, instrument calibration, sample analysis, data validation, and final evidence documentation).

The internal audits will be performed by the organization primarily responsible for performing the task. The external audits will be performed by U.S. EPA.

The performance audit is an independent check to evaluate the quality of data being generated. The system audit is an on-site review and evaluation of the facilities, instrumentation, quality control practices, data validation, and documentation practices.

This element will address the following information:

1) Field Performance and System Audits:

a) Internal and external performance and system audits to be performed will be addressed.

b) Staff responsible for performing these audits will be stated.

c) The frequency of the audit will be stated.

d) The audit procedures (including a checklist) and the documentation of audit procedures will be stated.

2) Laboratory Performance and System Audits:

a) Internal and external performance and system audits to be performed will be addressed.

b) Staff responsible for performing these audits will be stated.

c) The frequency of the audit will be stated.

d) The audit procedures (including a checklist) and the documentation of audit procedures will be stated.

SECTION 10

PERFORMANCE AND SYSTEM AUDITS

10.0 Performance and System Audits and Frequency

Performance and system audits of both field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the FSP and QAPP. The audits of field and laboratory activities include two independent parts: internal and external audits.

10.1 Field Performance and System Audits

10.1.1 Internal Field Audits

10.1.1.1 Internal Field Audit Responsibilities

Internal audits of field activities including sampling and field measurements will be conducted by the [Contractor] QA Officer.

10.1.1.2 Internal Field Audit Frequency

These audits will verify that all established procedures are being followed. Internal field audits will be conducted at least once at the beginning of the site sample collection activities. **[If the project duration is long (e.g. greater than one year), a periodic frequency should be stated (e.g. semi-annually)].**

10.1.1.3 Internal Field Audit Procedures

The audits will include examination of field sampling records, field instrument operating records, sample collection, handling and packaging in compliance with the established procedures, maintenance of QA procedures, chain-of-custody, etc. Followup audits will be conducted to correct deficiencies, and to verify that QA procedures are maintained throughout the remediation. The audits will involve review of field measurement records, instrumentation calibration records, and sample documentation. The field audit checklist to be

used for this project is submitted with this QAPP.

10.1.2 External Field Audits

10.1.2.1 External Field Audit Responsibilities

External field audits may be conducted by the U.S. EPA [Permit Writer/Project Coordinator].

10.1.2.2 External Field Audit Frequency

External field audits may be conducted any time during the field operations. These audits may or may not be announced and are at the discretion of the U.S. EPA

10.1.2.3 Overview of the External Field Audit Process

External field audits will be conducted according to the field activity information presented in the QAPP.

10.2 Laboratory Performance and Systems Audits

10.2.1 Internal Laboratory Audits

10.2.1.1 Internal Lab Audit Responsibilities

The internal laboratory audit will be conducted by the [Contractor] QA Officer.

10.2.1.2 Internal Lab Audit Frequency

The internal lab system audits will be done on an annual basis while the internal lab performance audits will be conducted on a quarterly basis.

10.2.1.3 Internal Lab Audit Procedures

The internal lab system audits will include an examination of laboratory documentation on sample receiving, sample log-in, sample storage, chain-of-custody procedures, sample preparation and analysis, instrument operating records, etc. The performance audits will involve preparing blind QC samples and submitting them along with project samples to the laboratory for analysis throughout the project. The [Contractor] QA Officer will evaluate the analytical results of these blind performance samples to ensure the laboratory maintains acceptable QC performance. The laboratory audit checklist has been submitted.

10.2.2 External Laboratory Audits

10.2.2.1 External Lab Audit Responsibilities

An external audit will be conducted by U.S. EPA Region 5 Central Regional Laboratory (CRL).

10.2.2.2 External Lab Audit Frequency

An external lab audit will be conducted at least once prior to the initiation of the sampling and analysis activities. These audits may or may not be announced and are at the discretion of the U.S. EPA.

10.2.2.3 Overview of the External Lab Audit Process

External lab audits will include (but not be limited to) review of laboratory analytical procedures, laboratory on-site audits, and/or submission of performance evaluation samples to the laboratory for analysis.

QAPP ELEMENT 13

PREVENTATIVE MAINTENANCE

The following types of preventative maintenance will be described in this section:

1) **Field Instrument Preventative Maintenance**

Maintenance procedures for equipment such as thermometers, pH and conductivity meters will be addressed. The use of HNu detectors and organic vapor analyzer systems will be addressed in this Section of the QAPP unless used for health and safety purposes. It will be indicated how frequently such instruments are checked (possibly as part of daily calibration), and where and how frequently such checks will be documented. Lists of critical spare parts such as tape, pH probes and batteries should be presented in the QAPP, in tabular format (this table can be included in an appendix). Any other means for ensuring that equipment to be used in the field is routinely serviced, maintained or repaired will be stated.

2) **Laboratory Instrument Preventative Maintenance**

These procedures are designed to minimize the occurrence of instrument failure and other system malfunctions and will also be included in this section of the QAPP. The laboratory's (ies') schedule for maintenance of each instrument to be used during implementation of the project will be presented in tabular format. A list of critical spare parts necessary for maintaining this equipment will also be presented in tabular format. Although it is understood that laboratory instruments are usually maintained in accordance with manufacturer's specifications, it is not acceptable to submit copies of instrument manuals to satisfy the intent of this element. If preventative maintenance is performed through a vendor contract, this information will be stated.

SECTION 11

PREVENTATIVE MAINTENANCE

11.1. Field Instrument Preventative Maintenance

The field equipment for this project includes thermometers, pH meter, and conductivity meter. Specific preventative maintenance procedures to be followed for field equipment are those recommended by the manufacturer. Field instruments will be checked and calibrated daily before use. Calibration checks will be documented on the Field Meter/calibration log sheets. are indicated in a submitted Table. The maintenance schedule and trouble-shooting procedures for field instruments are indicated in a submitted table. Critical spare parts such as tape, pH probes, and batteries will be kept on-site to reduce downtime. Backup instruments and equipment will be available on-site or within 1 day shipment to avoid delays in the field schedule.

11.2. Laboratory Instrument Preventative Maintenance

As part of their QA/QC program, a routine preventative maintenance program is conducted by [laboratory name] to minimize the occurrence of instrument failure and other system malfunctions. Designated laboratory employees shall regularly perform routine scheduled maintenance and repair of [or to coordinate with the vendor for the repair of] all instruments. All maintenance that is performed shall be documented in the laboratory's operating record. All laboratory instruments are maintained in accordance with manufacturer's specification
A Table [in the Appendix to this Model QAPP] provides the frequency which components of key analytical instruments or equipment will be serviced.

QAPP ELEMENT 14

SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

In order to address this element of the QAPP, the procedures and equations to be used to aid in assessing the accuracy and precision of analytical data, and completeness of data collection shall be clearly documented. The equations to be used for calculation of percent recovery (%R), relative percent difference (RPD) and percent valid data will be indicated.

Precision of laboratory analysis will be assessed by comparing the analytical results between matrix spike/matrix spike duplicate for organic analysis, and laboratory duplicate analyses for inorganic analysis. The relative percent difference will be calculated for each pair of duplicate analyses as indicated below.

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

Where: S = First sample value (original or matrix spike value);

D = Second sample value (duplicate or matrix spike duplicate value)

Accuracy of laboratory results will be assessed for compliance with the established quality control criteria that are cited in Section 3 of the QAPP using the analytical results of method blanks, reagent/preparation blank, matrix spike/matrix spike duplicate samples, field blank, and bottle blanks. The percent recovery of matrix spike samples will be calculated as indicated below.

$$\%R = \frac{A - B}{C} \times 100$$

Where:

A = The analyte concentration determined experimentally from the spiked sample;

B = The background level determined by a separate analysis of the unspiked sample;

C = The amount of the spike added.

Data Completeness will be assessed for compliance with the amount of data required for decision making. The completeness is calculated as indicated below:

$$\text{Completeness} = \frac{\text{(number of valid measurements)}}{\text{(number of measurements planned)}} \times 100$$

Where "Valid Data" refers to numbers of investigational samples obtained or to be obtained for a specific purpose, or in order to satisfy a particular project objective.

Data completeness, precision, and accuracy must be addressed in the QAPP, with respect to both field and laboratory samples. In the sample section addressing this element, a means of acceptably providing this information to the U.S. EPA is presented.

SECTION 12

SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

12.1 Accuracy Assessment

In order to assure the accuracy of the analytical procedures, an environmental sample is randomly selected from each sample shipment received at the laboratory, and spiked with a known amount of the analyte or analytes to be evaluated. In general, a sample spike should be included in every set of 20 samples tested on each instrument. The spike sample is then analyzed. The increase in concentration of the analyte observed in the spiked sample, due to the addition of a known quantity of the analyte, compared to the reported value of the same analyte in the unspiked sample determines the percent recovery. Daily control charts are plotted for each commonly analyzed compound and kept on instrument-specific, matrix - specific, and analyte - specific bases. The percent recovery for a spiked sample is calculated according to the following formula:

$$\%R = \frac{\text{Amount in Spiked Sample} - \text{Amount in Sample}}{\text{Known Amount Added}} \times 100$$

12.2 Precision Assessment

Spiked samples are prepared by choosing a sample at random from each sample shipment received at the laboratory, dividing the sample into equal aliquots, and then spiking each of the aliquots with a known amount of analyte. The duplicate samples are then included in the analytical sample set. The splitting of the sample allows the analyst to determine the precision of the preparation and analytical techniques associated with the duplicate sample. The relative percent difference (RPD) between the spike and duplicate spike are calculated and plotted. The RPD is calculated according to the following formula:

$$RPD = \frac{\text{Amount in Spike 1} - \text{Amount in Spike 2}}{0.5(\text{Amount in Spike 1} + \text{Amount in Spike 2})} \times 100$$

12.3 Completeness Assessment

Completeness is the ratio of the number of valid sample results to the total number of samples analyzed with a specific matrix and/or analysis. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Completeness} = \frac{\text{(number of valid measurements)}}{\text{(number of measurements planned)}} \times 100$$

QAPP ELEMENT 15

CORRECTIVE ACTION

Information included in this QAPP element will address the entire project, not just the laboratory operation. More specifically, corrective action will focus on three general areas. These areas are 1) Field Corrective Action; 2) Laboratory Corrective Action; and 3) Corrective Action during Data Validation and Data Assessment. For each of the three areas, certain procedures and mechanisms must be stated. These include:

1. The mechanism of triggering the initiation of corrective actions;

2. The proper procedures to be used for initiating, developing, approving, and implementing the corrective actions;

3. Identification of the project personnel responsible for initiating, developing, approving, and implementing the corrective actions;

4. Alternate corrective actions to be taken; and

5. The documentation process for this corrective action will be stated

Corrective actions may be required for two classes of problems: 1) analytical and field equipment problems and 2) noncompliance problems. Analytical and equipment problems may occur during sampling and sample handling, sample preparation, laboratory instrumental analysis, and data review.

NOTE: Any corrective action issue noted above which directly impacts project data quality objectives will be reported immediately to the project manager.

An example of how the corrective action element for a particular project may be conveyed to the U.S. EPA in a QAPP follows. Any information inside square brackets ([]) denotes replacing this information with facility and/or contractor-specific names or information.

SECTION 13

CORRECTIVE ACTION

13.0 Corrective Action

Corrective action is the process of identifying, recommending, approving and implementing measures to counter unacceptable procedures or out of quality control performance which can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation and data assessment. All corrective action proposed and implemented should be documented in the regular quality assurance reports to management. Corrective action should only be implemented after approval by the [Facility] project manager, or his designee, the [Facility] field operations manager. If immediate corrective action is required, approvals secured by telephone from the [Facility] project manager should be documented in an additional memorandum.

For noncompliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying the [Facility] project manager, who in turn will notify the U.S. EPA RCRA Permit Writer/Project Coordinator. If the problem is analytical in nature, information on these problems will be promptly communicated to the U.S. EPA, Quality Assurance Section. Implementation of corrective action will be confirmed in writing through the same channels.

Any nonconformance with the established quality control procedures in the QAPP or Field Sampling Plan will be identified and corrected in accordance with the QAPP. The [Facility] project manager, or his designee, will issue a nonconformance report for each nonconformance condition. **[If the activity is being performed in accordance with a legal agreement, this, as well as any other sections of the QAPP, must comply with the legal agreement.]**

13.1 Field Corrective Action

Corrective action in the field can be needed when the sample

network is changed (i.e. more/less samples, sampling locations other than those specified in the QAPP, etc.), sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. In general, the field team (technician, [Facility] field operations manager, [Facility] project manager, and [Facility's] quality assurance officer) may identify the need for corrective action. The field staff in consultation with the field operation manager will recommend a corrective action. The [Facility] field operations manager will approve the corrective measure which will be implemented by the field team. It will be the responsibility of the [Facility] field operations manager to ensure the corrective action has been implemented.

If the corrective action will supplement the existing sampling plan (i.e. additional soil borings) using existing and approved procedures in the QAPP, corrective action approved by the [Facility] field operations manager will be documented. If corrective actions resulting in less samples (or analytical fractions), alternate locations, etc. which may cause project quality assurance objectives not to be achieved, it will be necessary that all levels of project management including the [Facility] project manager, and the U.S. EPA RCRA Permit Writer/Project Coordinator concur with the proposed action.

Corrective action resulting from internal field audits will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods. The [facility] quality assurance officer will identify deficiencies and recommended corrective action to the [Facility] project manager. Implementation of corrective actions will be performed by the [Facility] field operations manager and field team. Corrective action will be documented in quality assurance reports to the entire project management.

Corrective actions will be implemented and documented in the field record book. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by the U.S. EPA RCRA Permit Writer/Project Coordinator.

13.2 Laboratory Corrective Action

Corrective action in the laboratory may occur prior to, during and after initial analyses. A number of conditions such as broken sample containers, multiple phases, low/high pH readings, potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with lab analysts and section leaders, it may be necessary for the laboratory Quality Control Coordinator to approve the implementation of corrective action. The submitted standard operating procedures (SOPs) specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain quality control criteria are not met, etc. A summary of method-specific corrective actions are found in this QAPP.

The bench chemist will identify the need for corrective action. The [Laboratory] manager, in consultation with the [Laboratory] supervisor and staff, will approve the required corrective action to be implemented by the laboratory staff. The [Laboratory] QA manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, it will be necessary to inform all levels of project management including the U.S. EPA RCRA Permit Writer/Project Coordinator to concur with the corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the [Laboratory]'s corrective action log (signed by analyst, section leader and quality control coordinator), and the narrative data report sent from the laboratory to the [Contractor] data validator. If corrective action does not rectify the situation, the laboratory will contact the [Facility] project manager.

Section 13.3 Corrective Action During Data Validation and Data Assessment

The facility may identify the need for corrective action during either the data validation or data assessment. Potential types of corrective action may include resampling by the field team or

reinjection/reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the required quality assurance objectives (e.g. the holding time for samples is not exceeded, etc.) When the [Contractor] data assessor identifies a corrective action situation, it is the [Facility] project manager who will be responsible for approving the implementation of corrective action, including resampling, during data assessment. All corrective actions of this type will be documented by the [Facility] QA manager.

QAPP ELEMENT 16

QUALITY ASSURANCE REPORTS TO MANAGEMENT

Quality assurance reports must be submitted on a periodic basis to management during the course of the project. This is done to ensure that problems arising during the sampling and analysis phases of the project are investigated and corrected. This report will be submitted monthly (at a minimum) and can be part of the monthly progress report. This report at a minimum, will contain:

1. Data validation and assessment results since the last report; and

2. Field and laboratory audit results performed since the last report; and

3. Significant QA/QC problems, recommended solutions, and results of corrective actions.

The contents and nature of all QA reports that will be generated should be indicated in this section of the QAPP. For instance, The type of report, be it written or oral, interim versus final, should be specified in the QAPP. Furthermore, the contents of the QA reports should be specified. Some examples of relevant topics which may appear in QA reports are given below:

1. Minor changes in QAPP (NOTE: Major changes to procedures or responsibilities requires approval from the Region 5 QA Manager.);

2. Summary of QA/QC programs, training and other miscellaneous accomplishments;

3. Results of technical systems and performance evaluation audits;

4. Data quality assessment in terms of precision, accuracy, representativeness, completeness, comparability, and method detection limit;

5. Indication of whether the QA objectives were met; and

6. Limitations on use of the measurement data.

SECTION 14

QUALITY ASSURANCE REPORTS TO MANAGEMENT

The deliverables associated with the tasks identified in the RFI Workplan and monthly progress reports will contain separate QA sections in which data quality information collected during the task is summarized. Those reports will be the responsibility of the [Facility] project manager and will include the [Facility] Quality Assurance Officer report on the accuracy, precision, and completeness of the data as well as the results of the performance and system audits, and any corrective action needed or taken during the project.

14.1 Contents of Project QA Reports

The QA reports will contain on a routine basis all results of field and laboratory audits, all information generated during the past month reflecting on the achievement of specific data quality objectives, and a summary of corrective action that was implemented, and its immediate results on the project. The status of the project with respect to the Project Schedule included in the QAPP will be determined. Whenever necessary, updates on training provided, changes in key personnel, anticipated problems in the field or lab for the coming month that could bear on data quality along with proposed solutions, will be reported. Detailed references to QAPP modifications will also be highlighted. All QA reports will be prepared in written, final format by the [Facility] project manager or his designee.

In the event of an emergency, or in case it is essential to implement corrective action immediately, QA reports can be made by telephone to the appropriate individuals, as identified in the Project Organization or Corrective Action sections of this QAPP. However, these events, and their resolution will be addressed thoroughly in the next issue of the monthly QA report.

14.2 Frequency of QA Reports

The QA Reports will be prepared on a monthly basis. and will be delivered to all recipients by the end of the first full week of the month. The reports will continue without interruption, until the project has been completed. The frequency of any emergency reports that must be delivered verbally cannot be estimated at the present time.

14.3 Individuals Receiving/Reviewing QA Reports

All individuals identified in the Project Organization chart will receive copies of the monthly QA report.

APPENDIX TO MODEL QAPP

The documents enclosed in this Appendix provide examples of how certain information should be presented to the U.S. EPA Region 5. This Appendix was cited in previous sections of this Model QAPP, but the nature of the examples presented herein may not exactly correspond to the text of previous example sections. The following Tables and one guideline providing instruction on how to present Standard Operating Procedures, are included in this Appendix.

TABLE 1

Target Compound List
Volatile Organics Analytical Methods Summary

Volatile Organic Compounds	Chemical Abstracts Service Registry Number	Method Reference	Description	EQL[1] Ground Water (ug/L)	EQL[1] Low Soil/Sediment(ug/kg)
Chloro methane	74-87-3	SW-846[2] METs 8240,5030	GC/MS Purge and Trap	10	10
Dibromo methane	74-83-9	SW-846 METs 8240,5030	GC/MS Purge and Trap	10	10
Vinyl Chloride	75-01-4	SW-846 METs 8240,5030	GC/MS Purge and Trap	10	10
Chloro ethane	75-00-3	SW-846 METs 8240,5030	GC/MS Purge and Trap	10	10
Methylene Chloride	75-09-2	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
Acetone	67-64-1	SW-846 METs 8240,5030	GC/MS Purge and Trap	100	100
Carbon Disulfide	75-15-0	SW-846 METs 8240,5030	GC/MS Purge and Trap	100	100
1,1 Dichloro ethene	75-35-4	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
1,1 Dichloro ethane	75-35-3	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
1,2 Dichloro ethane	75-35-2	SW-846 METs 8240,5030	GC/MS Purge and Trap	10	10
Chloroform	67-66-3	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5

TABLE 1

Target Compound List
Volatile Organics Analytical Methods Summary

Volatile Organic Compounds	Chemical Abstracts Service Registry Number	Method Reference	Description	EQL[1] Ground Water (ug/L)	EQL[1] Low Soil/ Sediment (ug/kg)
1,2 Dichloroethane (Total)	107-06-2	SW-846 METs 8240, 5030	GC/MS Purge and Trap	10	10
Acetonitrile	75-05-8	SW-846 METs 8240, 5030	GC/MS Purge and Trap	100	100
Allyl Chloride	107-05-1	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Benzyl Chloride	100-44-7	SW-846 METs 8240, 5030	GC/MS Purge and Trap	100	100
2-Chloroethyl vinyl ether	110-75-8	SW-846 METs 8240, 5030	GC/MS Purge and Trap	10	10
2-Butanone	78-93-3	SW-846 METs 8240, 5030	GC/MS Purge and Trap	100	100
1,1,1-Trichloro-ethane	71-55-6	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Carbon Tetrachloride	56-23-5	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Bromodichloro-methane	75-27-4	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
1,1,2,2 Tetra-chloroethane	79-34-5	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
1,2 Dichloro-propane	78-87-5	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5

TABLE 1

Target Compound List
Volatile Organics Analytical Methods Summary

EQL[1]

Volatile Organic Compounds	Chemicals Abstracts Service Registry Number	Method Reference	Description	Ground water (ug/L)	Low Soil/ Sediment (ug/kg)
trans 1,3-Dichloropropene	5061-02-6	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
Trichloroethene	79-01-6	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
Chlorodibromo-methane	124-48-1	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
1,1,2-Trichloroethane	79-00-5	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
Benzene	71-43-2	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
cis-1,3 Dichloropropene	10061-01-5	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
Chloroprene	126-99-8	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
1,2-Dibromo-3-Chloropropane	96-12-8	SW-846 METs 8240,5030	GC/MS Purge and Trap	100	100
1,2-Dibromo-ethane	106-93-4	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
1,4-Dichloro-2-butene	764-41-0	SW-846 METs 8240,5030	GC/MS Purge and Trap	100	100
Bromoform	75-25-2	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5

TABLE 1

Target Compound List
Volatile Organics Analytical Methods Summary

EQL[1]

Volatile Organic Compounds	Chemical Abstract Service Registry Number	Method Reference	Description	Ground water (ug/L)	Low Soil/Sediment (!!g/kg)
2-Hexanone	591-78-6	SW-846 METs 8240, 5030	GC/MS Purge and Trap	50	50
4-Methyl-2-pentanone	108-10-1	SW-846 METs 8240, 5030	GC/MS Purge and Trap	50	50
Tetrachloroethene	127-18-4	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Toluene	108-88-3	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Chlorobenzene	108-90-7	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Ethyl Benzene	100-41-4	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Styrene	100-42-5	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Total Xylenes	1330-20-7	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Dichlorodifluoro-methane	75-71-8	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
trans-1,2-Dichloro-ethane	156-60-5	SW-846 METs 8240, 5030	GC/MN Purge and Trap	5	5
Ethyl methacrylate	97-63-2	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5

TABLE 1

Target Compound List
Volatile Organics Analytical Methods Summary

EQL[1]

Volatile Organic Compounds	Chemical Abstracts Service Registry Number	Method Reference	Description	Ground water (ug/L)	Low Soil/ Sediment (ug/kg)
Isobutyl Alcohol	78-83-1	SW-846 METs 8240,5030	GC/MS Purge and Trap	100	100
Methyacrylo nitrile	91-80-5	SW-846 METs 8240,5030	GC/MS Purge and Trap	100	100
Methyl iodide	74-88-4	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
Methyl methacrylate	80-62-6	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	50
Pentachloro ethane	76-01-7	SW-846 METs 8240,5030	GC/MS Purge and Trap	10	10
Propionitrile	78-02-9	SW-846 METs 8240,5030	GC/MS Purge and Trap	100	100
1,1,1,2-Tetra chloroethane	630-20-6	SW-846 METs 8240,5030	GC/MS Purge and Trap	100	100
1,2,3-Trichloro-propane	96-18-4	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5
Vinyl Acetate	108-05-4	SW-846 METs 8240,5030	GC/MS Purge and Trap	50	50
Acrolein	107-02-8	SW-846 METs 8240,5030	GC/MS Purge and Trap	100	100
Acrylonitrile	107-13-1	SW-846 METs 8240,5030	GC/MS Purge and Trap	100	100
Trichlorofluoro-methane	75-69-4	SW-846 METs 8240,5030	GC/MS Purge and Trap	5	5

[1]EQL: Estimated Quantitation Limit is from SW-846 (reference footnote 2 below).
[2]SW-846: EPA Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. SW-846, 3RD Edition, 1990.

TABLE 2

Quality Control Performance Criteria
for Matrix Spikes/Matrix Spike Duplicates and Surrogates

	Matrix Spike/Dup			
	%Recovery		%RPD	
	Water	Soil	Water	Soil
Volatile Organic Compounds				
1,1-Dichloroethene	61-145	59-173	14	22
Trichloroethene	71-120	62-137	14	23
Benzene	76-127	66-142	11	21
Toluene	76-125	59-139	13	21
Chlorobenzene	75-130	60-133	13	21

TABLE 3

	Matrix Spike/Dup				Surrogate	
	%Recovery		%RPD		%Recovery	
	Water	Soil	Water	Soil	Water	Soil
Pesticides/PCBs						
Tetrachloro-m-xylene					60-150	60-150
Decachlorobiphenyl					60-150	60-150
y-BHC (Lindane)	56-123	46-127	15	50		
Heptachlor	40-131	35-130	20	31		
Aldrin	40-120	34-132	22	43		
Dieldrin	52-126	31-134	18	38		
Endrin	56-121	42-139	21	45		
4,4[1]-DDT	38-127	23-134	27	50		

TABLE 4
Quality Control Performance Criteria
for Matrix Spikes/Matrix Spike Duplicates and Surrogates

	Matrix Spike/Dup				Surrogate	
	% Recovery		%RPD		%Recovery	
	Water	Soil	Water	Soil	Water	Soil
Semivolatile Organic Compounds						
Nitrobenzene-d5					35-114	23-120
2-Fluorobiphenyl					43-116	30-115
Terphenyl-d14					33-141	18-137
Phenol-d5					10-94	24-113
2-Fluorophenol					21-100	25-121
2,4,6-Tribromophenol					10-123	19-122
Phenol	12-110	26-90	42	35		
2-Chlorophenol	27-123	25-102	40	50		
1,4-Dichlorobenzene	36-97	28-104	28	27		
N-Nitroso-di-N-propylamine	41-116	41-126	38	38		
1,2,4-Trichlorobenzene	39-98	38-107	28	23		
4-Chloro-3-Methylphenol	23-97	26-103	42	33		
Acenapthene	46-118	31-137	31	19		
4-Nitrophenol	10-80	11-114	50	50		
2,4-Dinitrotoluene	24-96	28-89	38	47		
Pentachloropheneol	9-103	17-109	50	47		
Pyrene	26-127	35-142	31	36		

TABLE 5
SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
Field Quality Assurance/Quality Control Samples

SWMU[1]	SAMPLE MATRIX	FIELD PARAMETERS	LAB[3] PARAMETERS	INVESTIG ATIVE SAMPLES	MATRIX DUPLCT	MATRIX SPIKE[5]	BLANKS[6]	MATRIX TOTAL
#1-DSO LANDFILL	Soil	Qualitative screening with photoioniza-tion detector	Metals[2] Volatiles[2] Semivola-tiles[2]	No. Total 88 88 6 6 6 6	No. Total 9 9 1 1 1 1	No. Total 4 4 1 1 1 1	No. Total. 0 0 0 0 0 0	 101 8 8
#2-Storm water Retention Pond	Water	Qualitative screening with photoionization detector pH Specific Conductance Temperature	Metals Volatiles Semivola-tiles Cyanide	1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1	1 1 1 2 1 1 1 1	4 5 4 4
	Soil/ Sediment	Qualitative screening with photoionization detector	Metals Volatiles Semivola-tiles Cyanide	5 5 5 5 5 5 5 5	1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	6 6 6 6
#8, 9-Water Acid Tanks	Soil	Qualitative screening with photoionization detector	Metals pH	25 25 25 25	3 3 3 3	1 1 1 1	0 0 0 0	29 29
#13-Waste Acid Pit	Soil	Qualitative screening with photoionization detector Field pH	Metals pH	14 14 14 14	2 2 2 2	1 1 1 1	0 0 0 0	17 17

(1) Figure 1-2 shows the location of each SWMU
(2) Samples will be composited for metals and semivolatiles. See Section 3.1.2 of Work Plan for a description of sample locations.
(3) Analytes selected include 40 CFR Part 264, Appendix IX metals, cyanide, Target compound list volatiles and semivolatiles. See Tables 4-4, 4-5, and 4-6.

(4) The frequency of sampling is one for this RFI.
(5) Additional sample volume required for matrix spile/matrix spike duplicate.
(6) Blank totals include estimated trip, field blanks, and rinse blanks.

TABLE 5

Field Quality Assurance/Quality Control Samples

SWMU[1]	SAMPLE MATRIX	FIELD PARAMETERS	LAB PARA-METERS	INVESTI GATIVE SAMPLES No.	INVESTI GATIVE SAMPLES TOTAL	MATRIX DUPLICATES NO.	MATRIX DUPLICATES TOTAL	MATRIX SPIKE[5] NO.	MATRIX SPIKE[5] TOTAL	BLANKS[6] NO.	BLANKS[6] TOTAL	MATRIX TOTAL
#21, 22-slag Reclaim Dust Collector and Dumpster	Soil	Qualitative screening with photoionization detector	Metals	3	3	1	1	0	0	0	0	4
#25-Outfall 005	Water	Qualitative screening with photoionization detector	Semivolatiles	2	2	1	1	1	1	1	1	5
			Volatiles	2	2	1	1	1	1	2	2	6
		pH	Metals	2	2	1	1	1	1	1	1	5
		Specific Conductance	Cyanide	2	2	1	1	1	1	1	1	5
		Temperature										
	Soil	Qualitative screening with photoionization detector	Semivolatiles	3	3	1	1	1	1	0	0	4
			Volatiles	3	3	1	1	1	1	0	0	4
			Metals	3	3	1	1	1	1	0	0	4
			Cyanide	3	3	1	1	1	1	0	0	4
Back ground Samples	Soil	Qualitative screening with photoionization detector	Metals	20	20	2	2	1	1	0	0	23
			Volatiles	5	5	1	1	1	1	0	0	7
			Semivolatiles	5	5	1	1	1	1	0	0	7
		Field pH	Cyanide	20	20	2	2	1	1	0	0	23

(1) Figure 1-2 shows the location of each SWMU.
(2) Samples will be composited for metals and semivolatiles. See Section 3.1.2 of Work Plan for a description of sample locations.
(3) Analytes selected include 40 CFR Part 264, Appendix IX metals, cyanide, Target compound list volatiles and semivolatiles. See Tables 4-4, 4-5, and 4-6.
(4) The frequency of sampling is one for this RFI.
(5) Additional sample volume required for matrix spike/matrix spike duplicate.
(6) Blank totals include estimated trip, field blanks, and rinse blanks.

TABLE 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria Initial Calibration	Frequency Of Calibration	Frequency Of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria Continuing Calibration Verification
FAA	SW-846 EPA600/ 4-79/080 CLP	4 4 4	Correlation coefficient must be ≥ 0.995	At least daily, or as required (when CCV fails acceptance criteria)	Every calibration	90-110%R 90-110%R 90-110%R	Every 10 analytical samples	90-110%R 90-110%R 90-110%R
CVAA	SW-846 EPA600/ 4-79/080 CLP	4 4 4				80-120%R 80-120%R 80-120%R		80-120%R 80-120%R 80-120%R
ICP	SW-846 EPA600/ 4-79/080 CLP	1 1 1				90-110%R 90-110%R 90-110%R		90-110%R 90-110%R 90-110%R
GFAA	SW-846 EPA600/ 4-79/080 CLP	4 4 4				85-115%R 85-115%R 90-110%R		85-115%R 85-115%R 90-110%R
pH Meter	SW-846 CLP	3 3	± 0.1 STD units of true value			± 0.1 STD units of true value		± 0.1 STD unit of true value

Table 6
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GC/MS-volatiles	SW-846 (8240,8260)	5	%RSD<30% (CCC) 1,1-dichloroethene; chloroform 1,2-dichloropropene; toluene ethyl benzene; vinyl chloride RF>0.30(SPCC) chloromethane; 1,1-dichloroethane; bromoform (0.25); 1,1,2,2-tetrachloroethene; chlorobenzene	As needed	As needed	± 20%	daily 12 hr.	CCC %D <25% same SPCC criteria as initial calibration
	40CFR136, 624	5	all cmpds %RSD <35% or use calibration curve	As needed	As needed	± 20%R	daily 24 hr.	Compare w/Table 9 "Q" (attached)
	CLP SOW 2/88	5	same as SW846	As needed	As needed, usually w/PE's	± 20%R	daily 12 hr.	same as SW-846

TABLE 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	#Standards Initial Calibration	Acceptance/Rejection Criteria Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance Rejection Criteria Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance Rejection Criteria Continuing Calibration Verification

GC/MS volatiles	CLP-SOW OLMO 1.5	5	min RF Bromoform 0.10 Vinyl Chloride 0.10 1,1-dichloroethene 0.10 1,1-dichloroethane 0.20 Chloroform 0.20 1,2-dichloroethane 0.10 1,1,1-trichloroethane 0.10 carbon tetrachloride 0.10 bromodichloromethane 0.20 cis-1,3-dichloropropene 0.20 trichloroethene 0.30 dibromochloromethane 0.10 1,1,2-trichloroethane 0.10 benzene 0.50 trans-1,3-dichloropropene 0.10 bromoform 0.10 tetrachloroethene 0.20 1,1,2,2-tetrachloroethane 0.50 toluene 0.40 chlorobenzene 0.50 ethylbenzene 0.10 xylene 0.30 bromofluorobenzene 0.20 all % RSD <20.5 Other target compounds must meet minimum RF of 0.10 No % RSD criteria	As needed	As needed usually w/PE's	±20%R	Daily every 12 hours	RF criteria same as initial cal. % D <25.0
	EPA 524.2	5	% RSD < 20% or use cal curve all target compounds	As needed	As needed	± 20%	Daily every 8 hours	All compounds RF%D <30% ISTD areas >30%m <150% of initial cal.

TABLE 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria Continuing Calibration Verification
GC/MS semi-volatiles	SW846-8270	5	%RSD < 30% (CCC) acenaphthene 1,4-dichlorobenzene hexachlorobutadiene N-nitroso-diphenylamine di-octylphthalate fluoranthene benzo(a)pyrene 4-chloro-3-methylphenol 2,4-dichlorophenol 2-nitrophenol phenol pentachlorophenol 2,4,6-trichlorophenol RF>0.05(SPCC) N-nitrosodipropylamine hexachlorocyclopentadiene 2,4-dinitrophenol 4-nitrophenol	As needed	As needed	± 20%R	Daily, every 12 hours	CCC % D < 25% same SPCC criteria as initial cal.
	40CFR136 625	5	%RSD <35% or cal, curve all compounds	As needed	As needed	± 20%R	Daily every 24 hours	% D < 20%
	CLP SOW 2/88	5	Same as SW946-8270	As needed	As needed w/PE's	± 20%R	Daily every 12 hours	Same as SW846-8270

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS - semi-volatiles	CLP SOW OLM01.5	5	min. RF phenol 0.80 bis(2-chloroethyl)ether 0.70 2-chlorophenol 0.80 1,3-dichlorobenzene 0.60 1,4-dichlorobenzene 0.50 1,2-dichlorobenzene 0.40 2-methylphenol 0.70 4-methylphenol 0.60 N-nitrosodipropylamine 0.50 hexachloroethane 0.30 nitrobenzene 0.20 isophorone 0.40 2-nitrophenol 0.10 2,4-dimethylphenol 0.20 bis(2-chloroethoxy)methane 0.30 2,4-dichlorophenol 0.20 1,2,4-trichlorobenzene 0.20 naphthalene 0.70 4-chloro-3-methylphenol 0.20 2-methylnaphthalene 0.50 2,4,6-trichlorophenol 0.20 2,4,5-trichlorophenol 0.20 2-chloronaphthalene 0.80 acenaphthylene 1.30 2,6-dinitrotoluene 0.20 acenaphthene 0.80 dibenzofuran 0.80 2,4-dinitrotoluene 0.20 4-chlorophenylphenylether 0.40 fluorene 0.90 4-bromophenylphenylether 0.10 hexachlorobenzene 0.80					%D < 25 RF criteria same as initial calibration

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS - semi-volatiles	CLP SOW OLM01.5		pentachlorophenol 0.05 phenanthrene 0.70 anthracene 0.70 fluoranthene 0.60 pyrene 0.60 benz(a)anthracene 0.80 chrysene 0.70 benzo(b)fluoranthene 0.70 benzo(k)fluoranthene 0.70 benzo(a)pyrene 0.70 indeno(1,2,3,cd)pyrene 0.50 dibenz(a,h)anthracene 0.40 benzo(ghi)perylene 0.50 nitrobenzene d5 0.20 2-fluorobiphenyl 0.70 terphenyl-d_{14} 0.50 phenol-d_5 0.80 2-fluorophenol 0.60 2-chlorophenol-d_4 0.80 1,2-dichlorobenzene-d_4 0.40 %RSD < 20.5%. Other target compounds have no %RSD but must have RF > 0.01					
	EPA525	6	%RSD < 30% all compounds. Chromatographic separation of isomers	As needed	As needed	± 20%R	daily, every eight hours	RF %D < 30% ISTD areas > 30% < 150% from initial cal

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/NPD	N-P containing pesticides EPA 507	3	RF < 20% RSD or single point (single point must be within 20% of sample concentration)	As needed when CCV > 20% diff., upon detection of analyte after running low level single point to demonstrate detectability[2]	quarterly	20%D	2 times daily, beginning and end of day	20%D
	Organophosphorus pesticides SW-846 8141	5	RF < 20% RSD or cal. curve		quarterly	15%D	Daily	15%D
	Simetryn & Terbutryn EPA 619	3	RF < 10% RSD or cal. curve	Daily	As needed and with the prep of new std.	10%D	Each working shift	10%D
	Nitrosamines EPA 607	3	RF < 10% RSD or cal. curve	Daily	As needed and with the prep of new std.	15%D	Each working day	15%D
GC/FID	8015	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D	Quarterly	15%D	Daily	15%D
	SW-846 8100	5	RF < 20% RSD or cal. curve	With each analytical sequence	As needed, with prep of new std	15%D	Daily	15%D
	SW-846 8030	5	RF < 20% RSD or cal. curve	As needed when CCV > 15% D	As needed with prep of new standard	15%D	Daily, 10%, ending	15%D

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INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
HPLC	EPA 531.1	3-5	RF < 20% RSD or single point or calibration curve	As needed, when CCV > 20%D	Quarterly	20%D	Min. of 2 1 beg, 1 end	20%D
	SW-846 8310	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D or every 6 months	As needed, with prep of new std.	15%D	Daily, 10%	15%D
	EPA 610	3	RF < 10% RSD or cal. curve	When CCV > 15%D	As needed, with prep of new std.	15%D CCV vs. cal. curve	Daily 10%	15%D
GC-PID/ ELCD	EPA 502.2	3-5	RF < 10% RSD or cal. curve or single point cal.	When CCV > 20%D	As needed, with prep of new std. or quarterly	20%D	Daily	20%D
	EPA 601	3	RF < 10% RSD or cal. curve	As needed, when ICV or CCV > Table 2 criteria	As needed, with prep of new std.	See method 601 Table 2 criteria ~ 30%D (Q Value)	Daily Note: ICV = CCV in this case (different source than calibration stds.)	For % Rec. see method 601 Table 2 (Q Value)
	EPA 602	3	RF < 10% RSD or cal. curve	As needed, when ICV or CCV > Table 2 criteria		See method 602 Table 2 Criteria ~ 25%D (Q Value)		For % Rec. see method Table 2 (Q Value)
	SW-846 8010	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D	As needed, with prep of new std	15%D	Daily 10%, ending	15%D
	SW-846 8020					15%D		15%D

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INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-PID/ ELCD	SW-846 8021	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D	As needed with prep of new std.	15%D	Daily 10%, ending	15%D
FTIR	EPA 418.1	5	20%D Correlation Coeff. (r) ≥ 0.995	When CCV is > 20%D	As needed, with prep of new std.	20%D	Beg. and end of each sequence	20%D
	Standard Methods 503	5	20%D Correlation Coeff. (r) ≥ 0.995	When CCV is > 20%D	As needed, with prep of new std.	20%D	Beg. and end of each sequence	20%D
GC-ECD	EPA 548.1 (Endothall)	3	Linearity < 20% RSD	Each Run	As needed with each new std. quarterly at a minimum	80-110%	Every fifth injection	Primary column %D <15. Conf column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5%
	CLP-SOW 2/88	3	Linearity <20% RSD Generate calibration curve for all single analytes detected in samples where the % RSD ≥ 10% Retention time windows: Wide Bore capp. column: ± 0.75% Narrow Bore Capp. column: ± 0.15%	Each run or every 72 hours	As needed with each new std. quarterly at a minimum	80-110%	Every fifth injection	Primary column %D <15. Conf column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-ECD	EPA 508	3	Linearity <20% RSD	Each Run	As needed. With each new std Quarterly at a minimum.	80-110%R	Every fifth injection	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20%
	EPA 504	5	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5%
	APHA 509A (Standard Methods)	3	Linearity <20% RSD.	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15. Conf. column %D <20 R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20%

Table 6
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GC-ECD	EPA 608	3	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15. Conf. column %D <20 R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%
	SW-846 8080 SW-846 8150	5	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15. Conf column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-ECD	EPA 515.1	3	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection and beginning and end of run.	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5%
	EPA OLM01.3	3+Instr. Blank Multi-Comp. Targets Calib. as single point	All peaks 100% resolved. Performance evaluation mixtures (PEMs) ≤ 25.0 RPD. 1 Chromatogram from each of 2 indiv. A&B must yield peak highs of 50-100% of full scale. Resolution of midpoint std. mixes A&B ≥ 90% linearity ≤ 20% RSD except: Surrogates ≤ 30% Any 2 targets ≤ 30% Resolution check mix ≥ 60% Breakdown of DDT & Endrin ≤20%, Combined < 30%	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every 12 hours (PEM or indiv. A&B)	PEMs and Indiv. A&B within RT windows of init. calibration. PEMs RPD ≤ 25.0. Resolution of PEM must be 100%. Resolution of indiv. A&B ≥ 90% Breakdown of DDT & Endrin ≤ 20% Combined ≤ 30%

1 Number of Standards Run is 1, unless noted otherwise

2 Only when an unusually large analyte list requires analysis of more than one standard mix for injection by GC/NPD.

Table 6 - Attachment
GC/MS - Volatiles
Continuing Calibration Check - EPA Method 624

	Range for "Q" in ug/L
Benzene	12.8-27.2
Bromoform	14.2-25.8
Carbon tetrachloride	14.6-25.4
Chlorobenzene	13.2-26.8
Chloroethane	7.6-32.4
2-Chloroethylvinyl-ether	D-44.8
Chloroform	13.5-26.5
Dibromochloromethane	13.5-26.5
Bromodichloromethane	13.1-26.9
1,4-Dichlorobenzene	12.6-27.4
1,1-Dichloroethane	14.5-25.5
1,2-Dichloroethane	13.6-26.4
1,1-Dichloroethene	10.1-29.9
1,2-Dichloropropane	6.8-33.2
trans-1,3-Dichloropropene	10.0-30.0
Ethylbenzene	11.8-28.2
Bromomethane	2.8-37.2
Chloromethane	D-40.8
Methylene Chloride	12.1-27.9
1,1,2.2-Tetrachloroethane	12.1-27.9
Tetrachloroethene	14.7-25.3
Toluene	14.9-25.1
trans-1,2-Dichloroethene	13.9-26.1
1,1,1,-Trichloroethane	15.0-25.0
1,1,2-Trichloroethane	14.2-25.8
Trichloroethene	13.3-26.7
Trichlorofluoromethane	9.6-30.4
Vinyl Chloride	0.8-39.2

MODEL QAPP

TABLE 7

INSTRUMENT	ACTIVITY	FREQUENCY
Gas Chromatograph/ Mass Spectrometer	Change septum	Monthly/as needed
	Check carrier gas	Daily
	Change carrier gas	When pressure reaches 100 psi
	Change gas filters	Semi-annually/as needed
	Change trap on Tekmar	As needed/poor sensitivity
	Change GC column	As needed/poor sensitivity
	Clean MS source	As needed/poor sensitivity
	Check pump of leaks	Monthly
	Leak Check septum	As needed/when leak suspected
	Check gas flow	As needed
	Clean VOA purge glassware	As needed
	Cut capillary column	As needed
	Replace liner	As needed/contamination susp.
	Replace BNA seal	As needed/contamination susp.
Lachat Qulkchem AE	Dry and clean random access sampler	Daily
	Clean sample boats	Daily
	Coat rollers of pump with silicone spray	Every 2500 samples
	Replace pump tubes	Monthly
	Replace flames at port of valve module	Every 25000 samples
	Clean unions of the valve	Every 25000 samples
	Replace O-rings	When necessary
	Clean each port of the valve	Weekly
	Clean fitting of manifolds	Every 25000 samples
TOC	Replace water in IC Chamber	Weekly
	Clean IC chamber	As needed
	Clean underside of IC Inlet valve	As needed
	Check combustion tube	Daily
	Repack quartz wool in comb. tube	As needed
	Check TC inlet valve	Daily
	Clean TC inlet valve	As needed
	Refill acid bottle	When 2/3 empty
GPC	Change seals and oil motor on positive displacement pump	Ever 1500-2000 hours of use
	Repack column	When column flow is restricted or operating pressure increases
	Check system pressure	Check daily when operating
	Replace mesh at column effluent/influent	Replace if torn or wrinkled
	Check calibration, pressure and solvent flow	Check weekly

PREVENTATIVE MAINTENANCE

INSTRUMENT	ACTIVITY	FREQUENCY
Atomic Absorption Furnace	Clean furnace windows	Daily
	Check plumbing connections	Daily
	Change graphite tube	As needed
	Check gases	Daily
	Check autosampler and tubing	Daily
ICAP	Clean filters	Monthly
	Check gas flow	Daily
	Change tubing	Weekly
	Clean nebulizer	As needed
	Check autosampler and tubing	Daily
Gas Chromatograph-Volatiles	Check Hall propanol flow	Daily
	Check Hall furnace temp.	Daily
	Check PID sensitivity	Daily
	Change lamp	As needed
	Rinse purge devices	Daily
	Bake purge devices	Daily
	Check carrier gases	Daily
	Change carrier gases	As needed
	Check column flows	Daily
	Check for gas leaks	At each column change
	Replenish electrolytic conductivity detector solvents	As needed
	Clean transfer lines	As needed
Gas Chromatograph-Semivolatiles	Change septum	Every 100 shots or as needed
	Check carrier gas	Daily
	Change carrier gas	When pressure reaches 250 psi
	Change in-line filters	Every 6 mos. or as needed
	Remove first foot of capillary column	As needed
	Clean ECD	As needed
	Clean Nitrogen-Phosphorous Detector	As needed
	Check system for gas leaks	At each column change
	Replace column	As needed
	Clean FID	As needed
	Replace capillary injection port liner	At column change or as needed
	Replace capillary injection port seal	As column change or as needed
	Measure gas flow	After changing column
	Check syringe	Daily
	Change syringe	As needed

EQUIPMENT MONITORING

EQUIPMENT TYPE	ACTIVITY	FREQUENCY
Ovens	Temperature monitoring	Twice daily
Refrigerators	Temperature monitoring	Twice daily
Incubators	Temperature monitoring	Twice daily
Walk-in Cooler	Temperature monitoring	Twice daily

PREVENTATIVE MAINTENANCE

TABLE 8

INSTRUMENTS	MAINTENANCE PROCEDURES/SCHEDULE	SPARE PARTS IN STOCK
Photovac MicroTIP Photoionization Detector	1. Calibrate beginning and end of each day and as necessary during use. 2. Check battery, and recharge when low. 3. Clean lamp window every 24 hours of operation. 4. Replace dust filter every 240 hours of operation. 5. Replace sample pump every 5000 hours of operation.	1. Battery charger 2. Spare lamps 3. Spare filter cartridges
Thermo Environmental Model 580B Photoionization Detector	1. Calibrate beginning and end of each day, and as necessary during use. 2. Check battery, and recharge when low. 3. Clean lamp and dust filter as needed. 4. Replace water traps if they become wet.	1. Spare lamps 2. Spare dust filters.
Field Gas Chromatograph	1. Change injector septa daily. 2. Repack column when separation and linearity becomes poor. 3. Clean PID lamp before each initial calibration; change when sensitivity lost. 4. Clean injector port/liner weekly.	1. Septa 2. Empty columns and column packing 3. PID lamps 4. Injector lines
pH Meter	1. Calibrate beginning and end of each day, and as necessary during use. 2. Replace electrodes as needed.	1. pH buffers 2. Batteries 3. Spare electrodes
Conductivity Meter	1. Calibrate beginning and end of each day, and as necessary during use. 2. Check redline and replace batteries if does not calibrate.	1. Batteries
HNu Model Photoionization Detector	1. Calibrate beginning and end of each day, and as necessary during use. 2. Check battery, and recharge when low. 3. Clean UV lamp, ion chamber, and fan if calibration falls outside 10% of the calibration standard, or if readings are erratic.	1. Battery charger 2. Spare lamps

GUIDELINE FOR THE PREPARATION OF STANDARD OPERATING PROCEDURE

Analytical methods, including both qualitative and quantitative methods, to be used by laboratory selected for a specific project shall be submitted to Region 5 Quality Assurance Section (QAS) for review/approval prior to use in project activities. These analytical methods should be submitted in a format of standard operating procedure (SOP), which shall describe in detail the exact procedure and material required to analyze the samples. The following items shall be included in the standard operating procedure:

1. Scope and Application.
2. Safety precaution.
3. Sample Size Requirements, and Sample Collection (including sample handling, preservation and holding time).
4. Instrumental Detection Limits and/or Method Detection Limits, and working linear ranges for each parameter.
5. Interferences and Corrective Measurements.
6. Apparatus (including instruments, and instrumental parameters/conditions), and materials.
7. Reagents.
8. Calibration Procedures (including the preparation of calibration standard solutions, instrument tuning and performance check, etc.)
9. Sample preparations (i.e., extraction, digestion, distillation, etc.)
10. Diagram or tables that describes/outlines the procedure.
11. Step-by-step Analytical procedure (including separate procedure for each sample matrix if the method is used for more than one sample matrix).
12. Details of calibration (including the equation used for the calculation).
13. Quality control (QC) Requirements (i.e., analysis of method blank, reagent blank, duplicate samples, etc.)
14. Data Reporting Requirements (including data reporting units and data reporting format.)
15. Preventative Maintenance
16. References

Method validation data, if available, should be attached to the SOP to support the limitation and applicability of the method. If the method validation data is not available, the SOP shall include the effort of method validation to be done prior to the use of this method for sample analysis.

CHAIN OF CUSTODY EXAMPLES

SAMPLE TAG

1. Enter your project number for the site, which may be the first six digits of the CRL log number (see page C-21).

2. Enter the sampling station code, i.e., MWI, BLK. SSI. etc.

3. Enter date of sampling.

4. Enter time of sampling (military time only).

5. Specify "grab" or "composite" sample with an "X".

6. Insert station location. If the sample is a field blank or if to be used for the spike or duplicate analysis, notate here.

7. Obtain signature of sample team leader.

8. Indicate presence of preservative with an "X".

9. Specify analytes for analysis with an "X".

10a. Indicate traffic report number (i.e., EW846 or MEX013) for that sample if the samples are being shipped to the CLP. If the samples are going to the CRL, list the CRL log number.

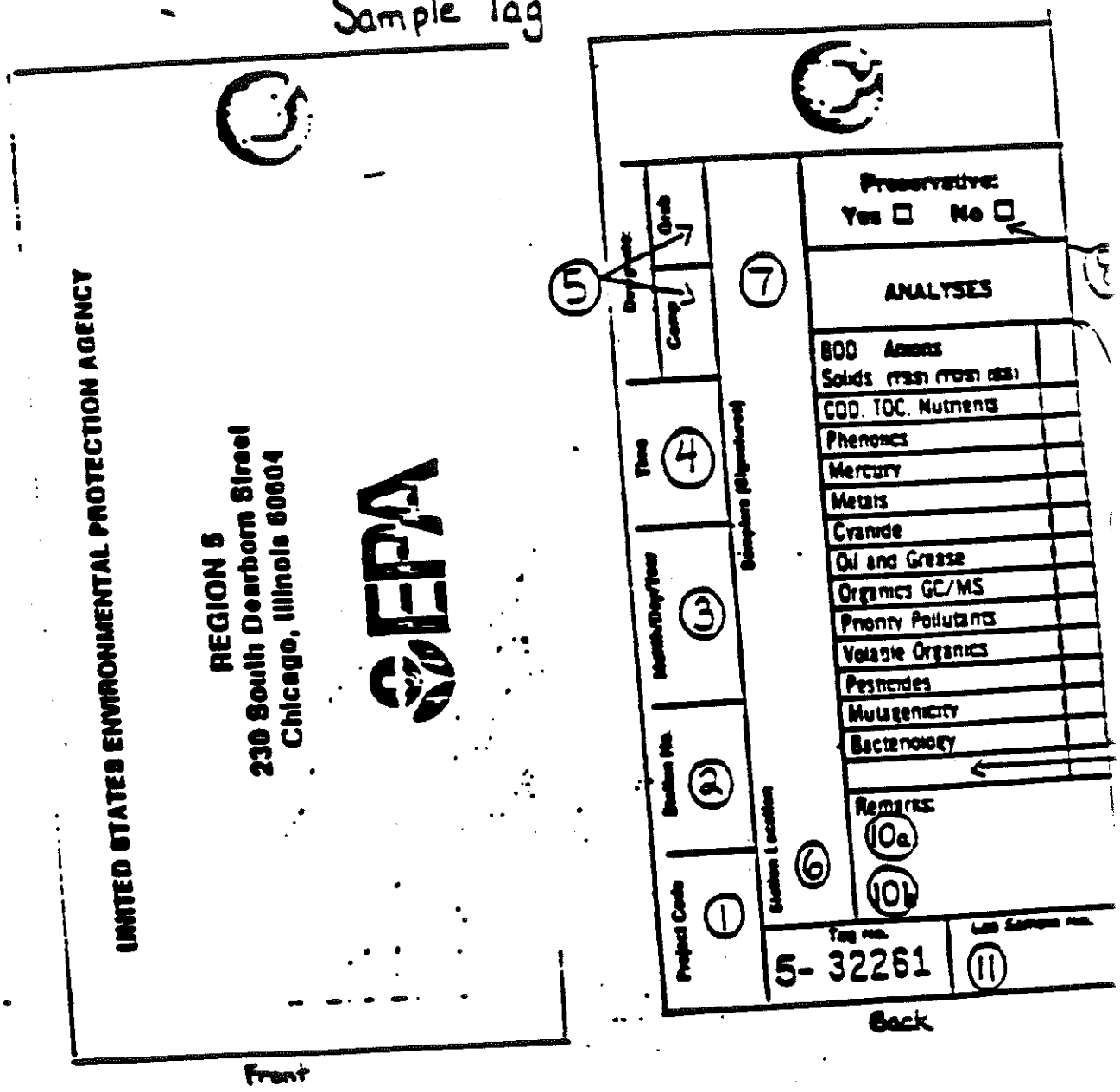
10b. Indicate the case number.

11. Leave BLANK (for laboratory use only).

12. Enter any desired analyses not listed on the tag provided (e.g., PCB's ammonia. sulfide, etc.) and mark the box with an "X".

NOTE: Each sample container should have a separate tag. All field blanks should be designated as such on the sample tags, either in the 'Remarks' field (10a and 10b) or in the 'Station Location' field (5).

Sample Tag



Each cooler should have 2 COC seals applied.

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION V
OFFICIAL SEAL

No. 13400

Chain of Custody Seal

Organic Traffic Report

(For Organic CLP Analysis)

EPA — United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703 557 2490 FTS 557-2490

SAS No. (If applicable):

Case No.: 1234 5

Project Code | Account Code

Additional Information

Superfund Program

Name: andfill

State: icago, FL | Site Spill ID: 22

2. Region No: V | Sampling Co.: Your Company

Sampler (Name): Your Name

Sampler Signature: Your signature

3. Type of Activity: ENF [X] ER [ ] LSI [ ] NPLD [ ] PA [ ] RA [ ] RD [ ] STSI [ ] O&M [ ] RI/FS [ ] SSI [ ] ST [ ] STPA [ ] Other [ ]

4. Date Shipped: 3/1/91 | Carrier: Fed-EX

Airbill Number: 5678901

5. Ship To: Lab Name
Address
Attn: ———

6. Preservative (Enter in Column D)
1. HCl
2. HNO_3
3. Na_2SO_4
4. H_2SO_4
5. Other (SAS) (Specify)
6. Ice only
N. Not preserved

7. Sample Description (Enter in Column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil (SAS)
7. Waste (SAS)
8. Other (SAS) (Specify)

Triple volume required for matrix spike/matrix spike duplicate analysis sample. Ship medium and high concentration samples in paint cans. See reverse for additional standard instructions. Please indicate sample to spike/duplicate.

CLP Sample Numbers (from labels)	A Enter # from Box 7	B Conc Low Med High	C Sample Type Comp / Grab	D Preservative from Box 6	E RAS Analysis VOA	E RAS Analysis BNA	E RAS Analysis Pest/PCB	E RAS Analysis High ARO/TOX	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Inorg. Samp. No.	
A101	1	L	G	1	X				5-169813-214	MW-01	3/1/91 9:00		MEA01	
A102	1	L	G	1	X				5-169815-216	MW02	3/1/91 10:00			
A102	1	L	G	N		X	X		5-169817-218	MW02	3/1/91 10:00		MEA02	Field dups: EA103
A103	1	L	G	1	X				5-169819-220	MW-03	3/1/91 11:00		MEA03	
A10														

Equipment for Case Complete? (Y/N): (Y)

TR COC # 34813 - 34814

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Signature	3/1/91 17:00				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Received by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	Is custody seal intact? Y/N/none

Inorganic Traffic Report

(For Inorganic CLP Analysis)

EPA — United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703 557 2490 FTS 557 2490

SAS No. (If applicable):

Case No.: 12345

Project Code | Account Code

Additional Information

Superfund Program

Name: Landfill

State: Chicago, IL

Site Spill ID: ZZ

2. Region No.: V | Sampling Co.: Your Company

Sampler (Name): Your Name

Sampler Signature: Your Signature

3. Type of Activity: ENF [X], ER [ ], LSI [ ], NPLD [ ], PA [ ], RA [ ], RD [ ], STSI [ ], O&M [ ], RI/FS [ ], SSI [ ], ST [ ], STPA [ ], Other [ ]

4. Date Shipped: 3/1/91 | Carrier: FedEx

Airbill Number: 1234567

5. Ship To: Lab Name; Address; Attn:

6. Preservative (Enter in Column D): 1. HNO_3 2. NaOH 3. HCl 4. H_2SO_4 5. Ice only 6. Other (SAS) (Specify) N. Not preserved

7. Sample Description (Enter in Column A): 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil (SAS) 7. Waste (SAS) 8. Other (SAS) (Specify)

Double volume required for spike/duplicate analysis sample.

Ship medium and high concentration samples in paint cans.

See reverse for additional standard instructions.

For total or dissolved metals, check only one RAS analysis per each sample.

CLP Sample Numbers (from bags)	A Enter # from Box 7	B Conc. Low Med High	C Sample Type: Comp Grab	D Preservative from Box 6	E - RAS Analysis: Metals Total	Metals Dissolved	Cyanide	Low Conc. Nutrient/Nitrate	Low Conc. Fluoride	High pH	High Conductivity	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Org. Samp. No.	
EA01	1	L	G	1	X							5-169803	MW-01	3/1/91 9:00		EA101	
EA01	1	L	G	2			X					5-169804	MW-01	3/1/91 9:00			
EA02	1	L	G	1	X							5-169805	MW-02	3/1/91 10:00		EA102	
EA02	1	L	G	2			X					5-169806	MW-02	3/1/91 10:00			
EA03	1	L	G	1	X							5-169807	MW-03	3/1/91 11:00		EA103	
EA03	1	L	G	2			X					5-169808	MW-03	3/1/91 11:00			Field dups: MEA03 MEA04
EA04	1	L	G	1	X							5-169809	MW-03	3/1/91 12:00		EA104	
EA04	1	L	G	2			X					5-169810	MW-03	3/1/91 12:00			
EA05	3	L	G	1	X							5-169811	FB-01	3/1/91 13:00			Field Blank
EA05	3	L	G	2			X					5-169812	FB-01	3/1/91 13:00		EA105	

Shipment for Case Complete? (Y/N): Y

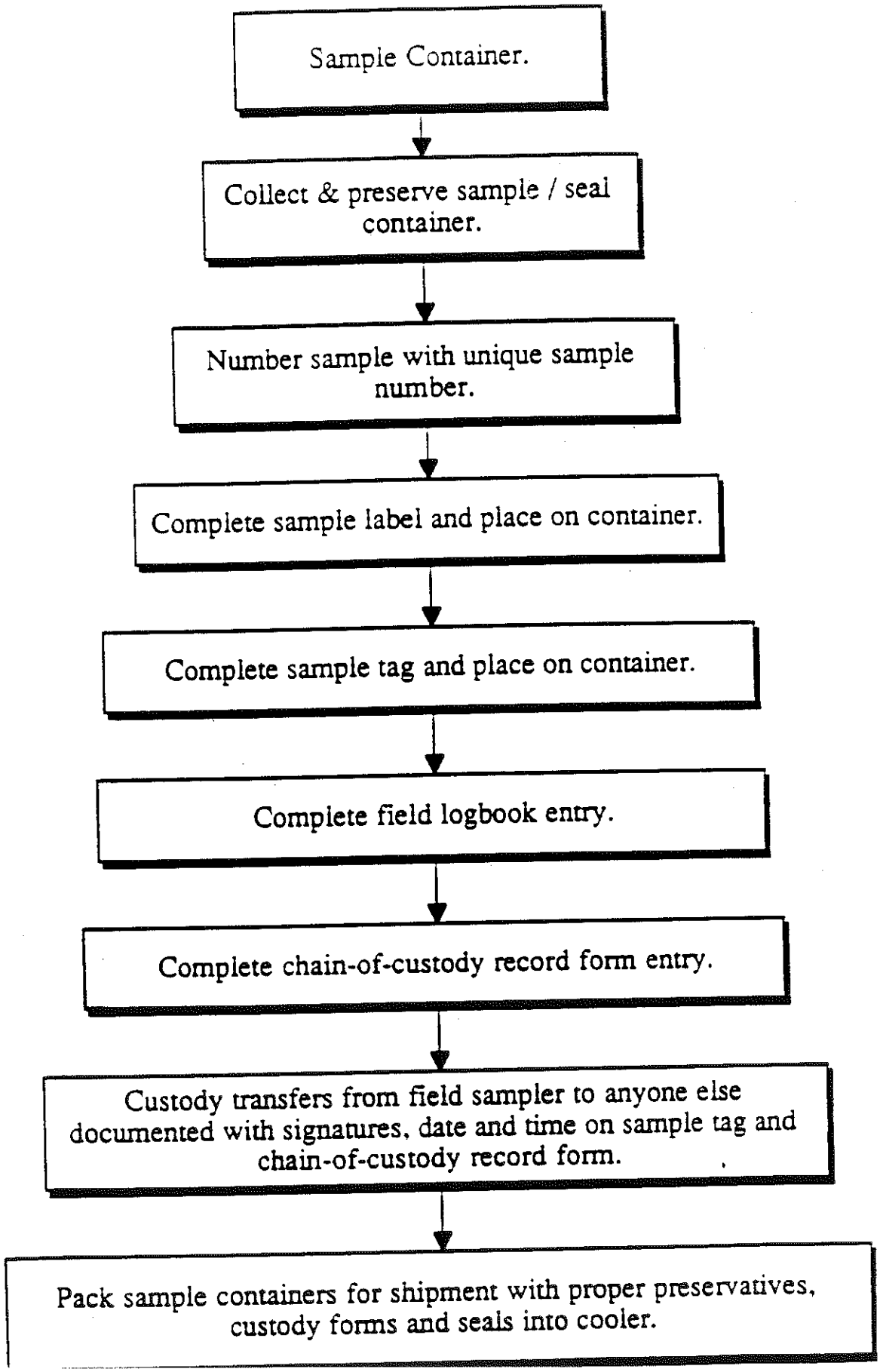
USE MEA01 for spike.
USE MEA02 for dup.

TR COC Seal #s 34815-34812

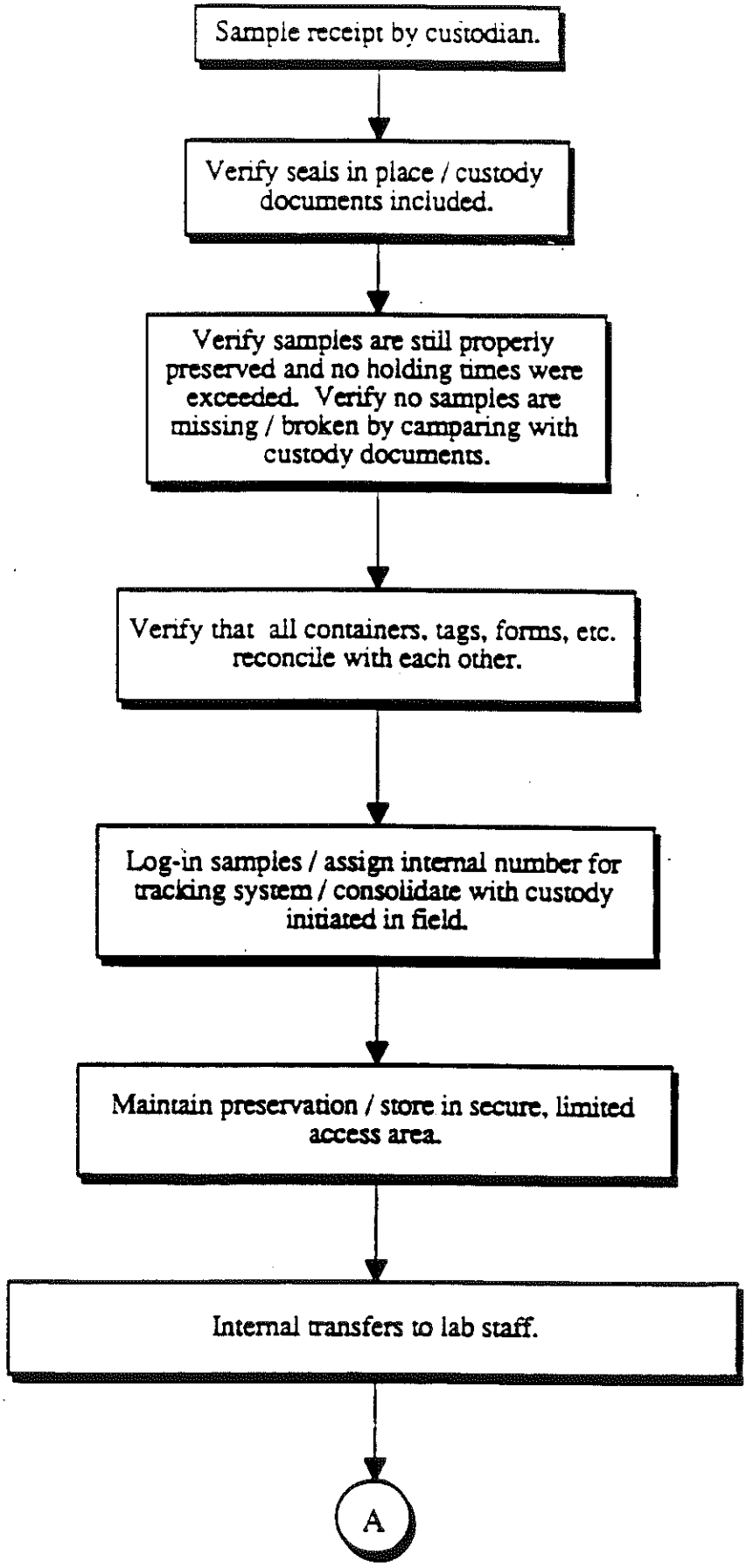
CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Signature	3/1/91 17:00				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Received by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks: Is custody seal intact? Y/N/none	

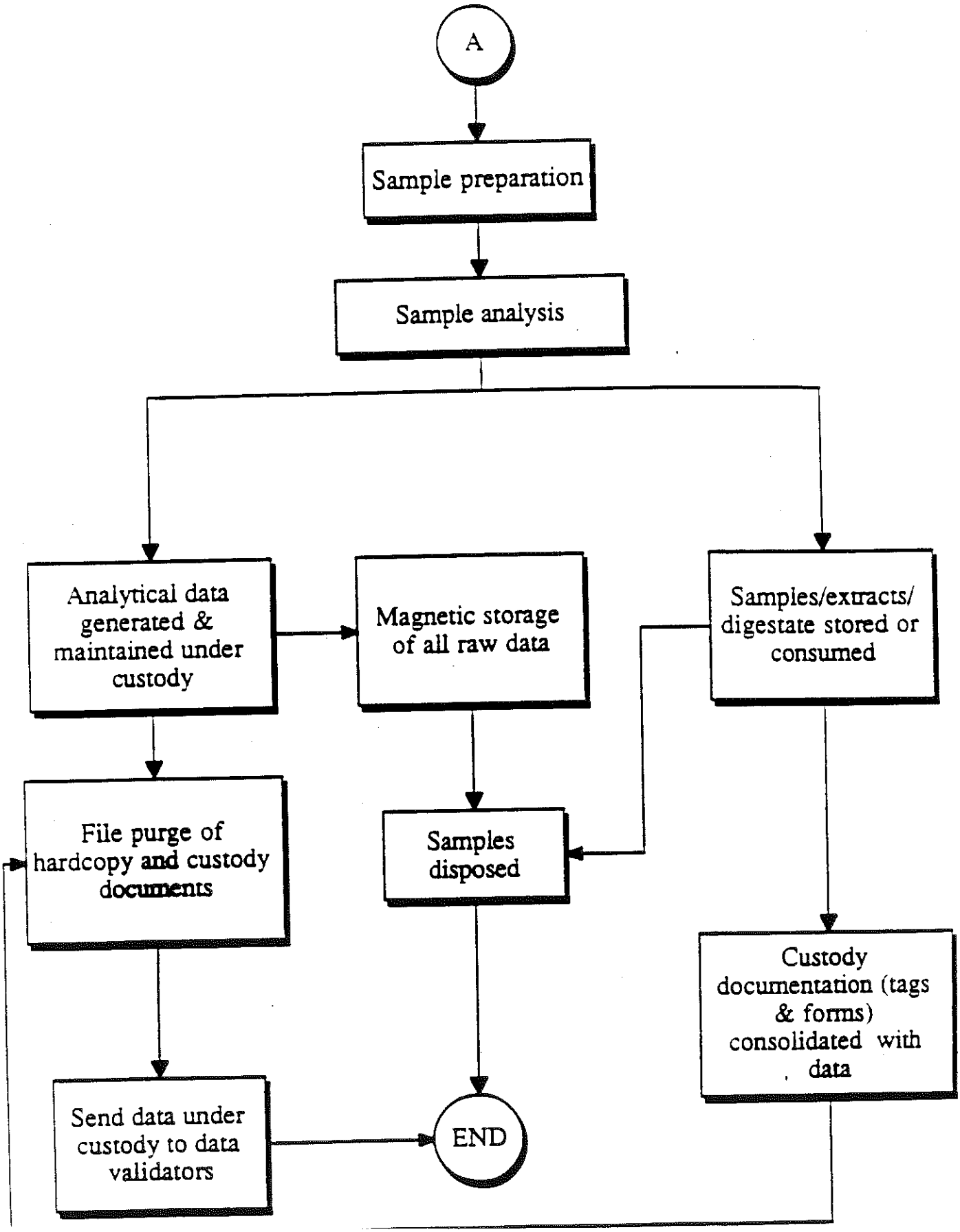
EXAMPLE FIELD CUSTODY SEQUENCE



EXAMPLE LAB CUSTODY SEQUENCE



EXAMPLE LAB CUSTODY SEQUENCE (continued)



ATTACHMENT VI

Reference List

The following list comprises guidance documents and other information, in chronological order, which may be useful in implementing a RCRA Section 3008(h) Order. This list does not include every guidance document pertaining to work performed under a RCRA Section 3008(h) Order. Contacts or additional information are included at the end of this list.

"*Health and Safety Requirements of Employees Employed in Field Activities*," EPA Order 1440.2, July 12, 1981.

"*Corrective Measures for Releases to Ground Water from SWMUs*," Draft Final, EPA/530-SW-88-020, March 1985.

"*Corrective Measures for Releases to Soil from SWMUs*," Draft Final EPA/530-SW-88-022, March 1985.

"*Technical Guidance for Corrective Measures -- Subsurface Gas*," EPA/530-SW-88-023, March 1985.

"*Technical Guidance for Corrective Measures--Determining Appropriate Technology and Response for Air Releases*," Draft Final, EPA/530-SW-88-021, March 1985.

"*RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (TEGD)*," OSWER Directive 9950.1, September 1986.

"*Technical Guidance Document: Construction Quality Assurance for Hazardous Waste Land Disposal Facilities*," EPA 530/SW-86/031, OSWER Directive 9472.003, October 1986.

"*RCRA Facility Assessment (RFA) Guidance*," EPA/530/SW-86/053, October 1986.

"*Data Quality Objectives for Remedial Response Activities*," EPA/540/G-87/003 & 004, OSWER Directive 9335.0-7B, March 1987.

"*A Compendium of Superfund Field Operations Methods*," Two Volumes, EPA/540/P-87/001a&b, OSWER Directive 9355.0-14, August 1987.

"*Technology Screening Guide for Treatment of CERCLA Soils and Sludges*," EPA/540/2-88/004, September 1988.

"*Ground-Water Modeling: An Overview and Status Report*," EPA/600/2-89/028, December 1988.

"*Risk Assessment Guidance for Superfund, Volume II: Environmental Evaluation Manual*," Interim Final, EPA/540/1-89/001, March 1989.

"*Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference Document*," EPA 600/3-89/013, March 1989.

"*Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*," Interim Final, EPA/530/SW-89/026, April 1989.

"*Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells*," EPA/600/4-89/034, April 1989.

"*Stabilization/Solidification for CERCLA and RCRA Wastes*," EPA/625/6-89/022, May 1989.

"*Interim Final RCRA Facility Investigation (RFI) Guidance*," Volumes I-IV, EPA/530/SW-89-031, May 1989.

"*Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments*," EPA/530/SW-89/047, July 1989.

"*Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A)*," Interim Final, EPA/540/1-89/002, December 1989

"*Air/Superfund National Technical Guidance Study Series*," Volumes I-IV, EPA 450/1-89-001,002,003,004 (1989 and 1990).

"*Handbook on In-Situ Treatment of Hazardous Waste-Contaminated Soils*," EPA/540/2-90/002, 1990.

"*Basics of Pump-and-Treat Groundwater Remediation Technology*," EPA/600/8-90/003, March 1990.

"*Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors*," OSWER Directive 9285.6-03, March 25, 1991.

"*Synopses of Federal Demonstrations of Innovative Site Remediation Technologies*," EPA/540/8-91/009, May 1991.

"*Bibliography of Federal Reports and Publications Describing Alternative and Innovative Treatment Technologies for Corrective Action and Site Remediation*," EPA/540/8-91/007, May 1991.

"*Handbook: Ground Water*," Volumes I and II, EPA/625/6-90/016 (a&b), September 1990 and July 1991.

"*Guide for Conducting Treatability Studies under CERCLA: Aerobic Biodegradation Remedy Screening*", EPA/540/2-91/013B, July 1991.

"*Handbook: Stabilization Technologies for RCRA Corrective Actions*," EPA/625/6-91/026, August 1991.

"*Guide for Conducting Treatability Studies under CERCLA: Soil Vapor Extraction*", EPA/540/2-91/019B, September 1991.

"*Guide for Conducting Treatability Studies under CERCLA: Soil Washing*," EPA/540/2-91/020B, September 1991.

"*Selected Alternative and Innovative Treatment Technologies for Corrective Action and Site Remediation*," EPA/540/8-91/092, 1991.

"*Characterizing Heterogeneous Wastes: Methods and Recommendations*," EPA/600/R-92/033, Feb. 1992.

"*Final Guidance for Data Useability in Risk Assessment*," (Parts A & B), OSWER Directive 9285.7-09A, April 1992.

"*Literature Survey of Innovative Technologies for Hazardous Waste Site Remediation: 1987 - 1991*," EPA/542/B-92/004, July 1992.

"*Handbook of RCRA Ground-Water Monitoring Constituents: Chemical and Physical Properties*," EPA/530/R-92/022, September 1992.

"*Ground-Water Monitoring: Draft Technical Guidance*," EPA/530-R-93-001, November 1992.

"*Statistical Training Course for Ground-Water Monitoring Data Analysis*," EPA/530/R-93/003, 1992.

"*Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration*," OSWER Directive 9234.2-25, September 1993.

"*RCRA Corrective Action Plan*," OSWER Directive 9902.3-2A, May 1994.

"*Land Use in the CERCLA Remedy Selection Process*," OSWER Directive 9355.7-04, May 25, 1995.

"*Standard Guide for Risk Based Corrective Action Applied to Petroleum Release Sites*," ASTM E-1739-95, November 1995. (As approved by Region 5 guidance policy)

"*Conducting Risk-Based Corrective Action for Federally-Regulated UST Petroleum Releases*," U.S. EPA, Region 5, December 7, 1995.

"*Soil Screening Guidance: Users Guide*," OSWER Publication 9355.4-23, April 1996.

"*Soil Screening Guidance: Technical Background Document*," EPA/540/R-95/128, May 1996.

"*Corrective Action for Releases From Solid Waste Management Units at Hazardous Waste Management Facilities*," Advanced Notice of Proposed Rulemaking, 61 Fed. Reg. 19432.

"*Region 5 Ecological Data Quality Levels*," Final Report, August 26, 1996.

When Final - "*Risk-Based Corrective Action for Chemical Releases*," ASTM Method.

GENERAL INFORMATION:

"*OSWER Directives - System Catalog*," OSWER Directive 9013.15-3D, March 1992. (Provides a list of OSWER Directives published through March 1991.)

"*Technical Support Services for Superfund Site Remediation and RCRA Corrective Action*," (third edition), EPA/540/8-91/091, March 1992.

"*Accessing Federal Data Bases for Contaminated Site Clean-Up Technologies*," EPA/540/8-91/008, May 1991.

"*Memorandum on the Use of Supplemental Environmental Projects, Amendment to GM 22*," James M. Strock, February 12, 1991.

"*Catalog of Office of Waste Programs Enforcement Publications*," EPA/540/8-90/016, November 1990.

"*A Catalogue of Hazardous and Solid Waste Publications*," EPA 530-SW-91-013, May 1991.

USEFUL TELEPHONE NUMBERS:

RCRA/CERCLA/UST Hotline: (800) 424-9346

U.S. EPA's Office of Research and development publishes occasional groundwater and engineering issue papers. For information, contact: ORD Publications Office, Center for Environmental Research Information (CERI): (513) 569-7562

National Technical Information Service (NTIS): (703) 487-4650